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THE  
H I S T O R Y  
OF THE  
ROYAL SOCIETY of LONDON,  
FOR IMPROVING OF  
NATURAL KNOWLEDGE,  
FROM ITS FIRST RISE.  
IN WHICH

The most considerable of those Papers communicated to the  
SOCIETY, which have hitherto not been published, are inserted in their  
proper order,

AS A SUPPLEMENT TO  
THE PHILOSOPHICAL TRANSACTIONS.

By THOMAS BIRCH, D.D.

SECRETARY to the ROYAL SOCIETY.

VOL. IV.



*Talem intellige PHILOSOPHIAM NATURALEM, qua non abeat in sumas speculationum subtilium  
aut sublimium, sed qua efficaciter operetur ad sublevanda humana vita incommoda. BACON de  
Augm. Societat. L. ii. c. 2.*

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THE  
H I S T O R Y  
OF THE  
ROYAL SOCIETY of LONDON,  
FROM ITS FIRST RISE.

**J**ANUARY 8, 1673. Sir CHRISTOPHER WREN vice-president in the chair.

The minutes of December 18, 1679, were read.

Mr. HOOKE read another letter of his to Mr. NEWTON concerning some farther account of his theory of circular motion and attraction; as also several observations and deductions from that theory; as 1. That pendulum clocks must vary their velocity in several climates. 2. That this variation must also happen at different heights in the same climate: Which last remark he confirmed by an observation of Mr. HALLEY at St. Helena; and 3. as a consequence of these, that a pendulum was unfit for an universal standard of measure.

Dr. PAPIN being present at the reading of this letter related, that a person employed by the Royal Academy of Sciences at Paris to try pendulum clocks in places near the line found them to go much too slow; and that the said Academy doubted the truth of this fact, but supposed, that he had been some way mistaken, though he with much confidence affirmed the matter of fact to be true, but knew no reason of it.

Mr. HOOKE read also a letter of Mr. BALLE's, giving an account of his thoughts concerning the hypothesis of Mons. MALLEMONT.

VOL. IV.

B

Dr.

Dr. Tryon read the first part of his observations made upon the porpoise; the remaining part being referred to another meeting; and his discourse was ordered to be registered<sup>a</sup>.

Mr. Hooke shewed an experiment of the putting of camphire into aquafortis, whereby that gum is presently converted into oil, and swims in that form upon the aquafortis.

He was desired to make his trials as soon as possible of Mr. Newton's experiment concerning the earth's diurnal motion.

The experiment to try the comparative weight of tin, lead, and the mixture of tin and lead was prepared; but it being late it was referred to the next meeting.

January 14, at a meeting of the COUNCIL at the president's house were present,

Sir JOSEPH WILLIAMSON, presid<sup>t</sup>

Sir ROBERT SOUTHWELL

Mr. COLWALL

Mr. HILL

Dr. HOLDER

Dr. KING

Dr. GALE,

Mr. HOOKE.

Mr. HILL and Dr. GALE having spoken with Mr. POVEY concerning Monf. FAUBERT's treaty about Chelsea College, reported, that Mr. POVEY was yet in hopes, that Monf. FAUBERT would go on with his design; and that he would speak with Monf. FAUBERT, and return his positive resolution on that affair.

Sir CHRISTOPHER WREN, Dr. CROUNE, Mr. HILL, Dr. GALE, Mr. HOOKE, or any three of them, were empowered to treat with Mr. ROSSINGTON concerning Chelsea College. And, if he should accept of the same conditions, that were proposed by Monf. FAUBERT, to agree with him; otherwise to report their proceedings to the Council.

Mr. HUNT was called in, and demanded, what he would expect for employing all his time in the service of the Society: Whereupon he said, that he would refer himself for his reward to the Council, but that he had been informed, that Mr. SHORTGRAVE had sometimes been allowed 50*l.* *per ann.* Whereupon 40 *l.* *per ann.* being proposed to him in full for all business done for the Society, the ten pounds already allowed him being part thereof, he readily accepted thereof.

January 15, at a meeting of the SOCIETY, Mr. HENSHAW vice-president in the chair.

<sup>a</sup> It was not entered in the Register, but it was printed at London 1680, under the title of *Placota: or, The Anatomy of a Porpoise dissected*

at Gresham College, with a preliminary discourse concerning anatomy, and a natural history of animals.

The minutes of January 8th were read; which gave occasion to discourse about the experiments made at the last meeting with camphire and aquafortis.

Mr. HENSHAW related, that camphire so liquified had been found a certain and speedy remedy for the tooth-ach, arising from hollow teeth.

Dr. GREW supposed, that it might be from the acidity given it by the aquafortis; for that all acids very much contribute to the fastening and strengthening of the teeth. Mr. Hooke supposed, that a moderate acid might serve to cleanse the teeth, if foul; but that the acidity of aquafortis was much too violent; and he conceived, that it would rather damage the tooth itself, and so leave it more subject to external injuries from acids or other noxious qualities; and that it is a general observation, that after eating sharp and acid juices the teeth will for some time be very sensible and tender, and be much more affected with sharp or sweet juices, or with hot or cold substances, than at other times.

Mr. POVEY related from his own experience upon his own teeth, that the filing of a long and slender tooth had made it grow thick, and fill the place between the other teeth.

Mr. HENSHAW related an experiment of setting an artificial tooth into the place of another tooth newly drawn out; whereby it proved, that the artificial tooth being so put into the socket of the jaw, the gum was observed to close and grow about it, and fix it, as if it had been the natural tooth.

Mr. POVEY related, that he had known a great part of the jaw-bone on one side taken out, and that yet the person was able to chew and grind his meat.

Mention was made also of others, who had lost all their teeth, and were notwithstanding able to chew their food, their gums growing callous.

Mr. Hooke produced the translation of a long letter, which he had received from Mr. LEEUWENHOEK, written in Low Dutch; together with several curious draughts of small pieces of wood observed in the microscope; as also the letter itself. A part of this translation was read, and the delineations examined, wherein were explained the several vessels and curious texture of the parts of wood. The remaining part was referred to the next meeting.

The experiment shewed was the examination of the specific weights of tin, and a mixture of equal parts of lead and tin; which was done by weighing them first in the air, and then in the water, and taking notice of their particular gravities. The weights of them were as follow:

	before melting	in air	in water	the difference		
Tin	3840	3536	3044	492	$7\frac{2}{3}$	$7\frac{1}{3}$
Lead	3840	3628	3266	362	$10\frac{2}{3}$	$10\frac{1}{3}$
Tin and lead	7680	7096	6120	976	$7\frac{1}{3}$	$7\frac{1}{3}$

B 2

January

January 21, at a meeting of the COUNCIL at the president's house were present,

Sir JOSEPH WILLIAMSON, presid'  
 Sir ROBERT SOUTHWELL  
 Dr. HOLDER  
 Mr. HILL

Dr. CROUNE  
 Dr. GALE  
 Mr. HOOKE.

The business of the *New Atlas* undertaken by Mr. PITT, was debated; and it was resolved, that Mr. PITT should be desired to give a meeting to those members of the council, who were concerned and named in that design, and to take an account of the present state and progress of that work.

Dr. CROUNE made the following proposal, as from Mr. ROSSINGTON, concerning Chelsea college; that the said Mr. ROSSINGTON was willing to take a lease of that college and the ground belonging to it, being about six acres, for 61 years; at 30*l.* *per ann.*, and to be obliged to lay out in substantial building upon the premises the sum of \* \*. Whereupon it was proposed, that Mr. ROSSINGTON should be farther treated withal, to see, if he could be prevailed with to give 35*l.* *per ann.* rent for 61 years: but rather than break off with him, to comply with his proposal of 30*l.* *per ann.* &c. only that it be insisted on, that he lay out upon the premises in substantial building 2000*l.* at the least within two years at farthest, and to give good security for the performance of the same. And it was recommended to Sir CHRISTOPHER WREN, Mr. HILL, and Dr. CROUNE, Mr. COLWALL, Dr. GALE, and Mr. HOOKE, or any three of them, to treat and agree with Mr. ROSSINGTON accordingly.

Dr. CROUNE proposing from Mr. COLLINS, that the latter was ready to print two volumes of algebra, written by Dr. WALLIS, Mr. BAKER, Mr. NEWTON, &c. provided the society would engage to take off 60 copies after the rate of 1*d.*  $\frac{1}{2}$  *per* sheet; it was ordered, that Mr. COLLINS should be desired to make his proposal in writing; and that the society would farther consider of encouraging the proposal.

January 22, at a meeting of the SOCIETY, Mr. HENSHAW vice-president in the chair.

The minutes of January 15th were read, which gave occasion of discoursing farther concerning camphire.

Sir WILLIAM PETTY related, that the powder of camphire, though mixed with stow, would burn when kindled.

Mr. HENSHAW related, that the king of Achim had great quantities of it, which he kept in chests, which, when he had a mind to burn ships in his harbour, he would pour out upon the sea; part of which swimming powder being fired, would give fire to all the rest, that swam upon the water, and thereby set fire to the outside of any ship being at anchor in his harbour.

Dr.

Dr. CROUNE mentioned, that, the society had a glass of oil of champhire sent from Mr. VERNATTI, which he conceived to be extracted from the camphire-tree.

Others supposed, that it was the wood of cinnamon, that yielded the camphire gum, and consequently, that the cinnamon and the camphire came both from the same tree, the cinnamon (called *camello*) being the bark shrunk up into a pipe, and the wood of the tree being that, which is called camphire-wood.

Mr. HENSHAW was of opinion, that a caustic often stops the pain of the teeth by destroying the worms, and also making the part senseless.

Mr. HOOKE read a letter, which he had received from Mr. LEEWENHOECK, giving account of some further discoveries of an exceeding small sort of worms found in ginger-water; as also the reasons, why he conceived, that the parts of water cannot be made visible by a microscope.

Mr. HOOKE produced a phosphorus given him by Dr. SLARE, which was examined by Mr. HENSHAW, Sir CYRIL WYCHE, and several others, and was found to be very receptive of light.

Mr. HOOKE shewed the ball, that had been let fall from the height of 27 feet, and fell into a box full of tobacco pipe-clay, sticking in the clay, upon the surface of which were made lines crossing each other: which shewed the true perpendicular point indicated by the ball, when it hung suspended by a thread from the top, and how much the ball had varied from that perpendicular in its descent towards the South and East: and he explained the manner, how the same was performed in all particulars. It was desired, that this experiment might be made before a number of the society, who might be witnesses of it before the next meeting. The time appointed was the Monday following at three in the afternoon.

The experiment of weighing the mixture of copper and lead was tried by examining its weight both in air and water; and thereby it was found, that the said mixture in the air weighed 4188 grains; in the water 3746 grains; whence the weight of it to that of water was as  $9\frac{1}{4}$ , to one, or  $9\frac{1}{4}$  to one.

Dr. CHRISTIAN HEUSCH, principal physician to the elector Palatine, who was present at this meeting, was proposed candidate by Mr. HOOKE; as were also Mr. THOMAS FIRMIN and Mr. JOHN HOUGHTON.

January 25, the president in the chair.

The minutes of the 22d instant were read; and upon discoursing about the small creatures discovered by Mr. LEEWENHOECK in ginger-water mixed with pepper-water, it was ordered, that some should be prepared against the next meeting.

Mr. COLWALL moved, that a magnetical needle might be made for the society, and lent to Mr. FLAMSTEAD to make observations at Greenwich of the variation of the needle; and it was ordered, that such a needle should be made, and that Mr. FLAMSTEAD might take care to have it well made.

Dr. HEUSCH, Mr. FIRMIN and Mr. HOUGHTON were elected; as was also Mr. LEEWENHOEK upon the motion of Dr. CROUNE, and Dr. GALE was desired to draw up a diploma to be sent to him.

Mr. HOOKE read an account of the experiments, which had been shewn to the society of the comparative weight of two mixed metals with the weight of the several metals, out of which they were compounded; from which he deduced, that the invention of ARCHIMEDES to find the cheat of the goldsmith in making HIERO's crown, though in itself very ingenious, might not be sufficient to perform what he designed by it; for that some two metals compounded made a heavier, and some other two a much lighter, than they really ought.

Sir WILLIAM PETTY explained the experiment, whereby the two metals seemed to penetrate each other, by the filling a vessel first with large bullets or shot, as of culverines; then by putting into the same musket-bullets, which would run into the cavities between the culverine-shot; and when no more of those could be put in, then by pouring in small bird-shot, then sand, and last of all water; in every one of which fillings the vessel might be said to be as full of these bodies, as it could be; and yet by reason of the interstices left between them could receive bodies of smaller parts.

He farther discoursed concerning what things were convenient to be observed in other compositions for the future, as colour, malleableness, hardness, brittleness, &c. together with the specific gravity: and he mentioned, that there were other qualities also observable in some metals, as that smiths generally observe, that if any lead were spilt in their fire, the coals would not burn; nor will iron weld well till all those were thrown out.

He supposed, that the reason, why tin put into lead makes it brittle and unfit for some uses, might be the disordering the parts of the lead, as by making those parts lie across, which before lay side by side; and that tin might be a kind of ferment of metals.

Upon this it was discoursed what was the best method of prosecuting experiments; and it was propounded by the president, that the best way was to proceed synthetically by first making the proposition what was designed to be proved, and then proceeding with the experiments to make the proof.

Sir THEODORE DE VAUX queried, whether it would be agreeable to the society to bring in some accounts, which he had of experiments made by Sir THOMAS MAYERNE, that the society might examine, which of them were considerable and fit to be again examined. Upon which the society desired, that he would produce such papers, and spoke of appointing some persons to examine them. The

The president moved, that all experiments might be examined by a committee chosen for that purpose.

Sir WILLIAM PETTY desired, that the operator might be employed for making the apparatus; and in the trial of some experiments: to which the president and society agreed, and Mr. HUNT was ordered to attend accordingly.

Sir WILLIAM PETTY likewise mentioned it as a very desirable thing, that every member of the society would have some aim or design for promoting the ends of the society; and that he would do something in order to prosecute such design: and he wished, that the members would principally aim at such experiments or observations, as might prove of great and immediate use.

The president acquainted the society, that the council had met several times to consider of the best ways of carrying on the design of the society; and had made some orders concerning it, which he caused to be read; and it was ordered, that the amanuensis should write them in a fair hand to lie on the table of the society.

The business of the philosophical gazettes was then discoursed of; and it was desired, that the matter should be considered against the next meeting of the society; that the society should not be intitled to it: that the form should be half a sheet in folio, and not to be more than 2*d* price. This method, it was supposed, would much propagate natural philosophy and the English language.

It was farther mentioned, that the printer should be discoursed with as to the number to be printed, and the paper and letter.

It was desired, that it might be recommended to the council to settle this matter.

The experiment to be tried at the next meeting was the examination of the mixture of gold and silver; and Mr. HILL, Dr. BROWN, Mr. BERRY, and Dr. CROUNE were appointed a committee to see the examination of it on the Monday following at three in the afternoon in the operator's lodgings.

*February 5,* the president in the chair.

Dr. HEUSCH and Mr. HOUGHTON subscribed and were admitted,

Mr. PETER PERKINS was chosen and admitted.

The minutes of January 29th were read, and several matters were discoursed of about the melting of metals.

Mr. HENSHAW remarked, that sulphur was very destructive to most metals, as that it would melt iron, and make it drop; that it would calcine silver so as to make it hard to be reduced.

The method of making experiments was also farther discoursed of; that they should be made in order to prove a theory propounded: but Sir WILLIAM PETTY was of opinion, that they would be more faithfully made and delivered, if they were not made to help out a theory, because that might prepossess and bias the experimenter.

Mr. HOOKE gave an account of some other qualities, which he had taken notice of in the mixture of tin and copper, as 1. That the colour of the copper was quite destroyed, it appearing much of the colour of iron, when polished. 2. That the composition, which was made of two very malleable metals, when mixt, became friable and brittle. 3. That it bore a pretty good polish and reflection. 4. That though copper is exceedingly hard to be melted, yet this mixture melted very easily. 5. That viewing the polished surface of it with a glass, he found it very full of extremely small holes or blebs in the metal.

Sir THEODORE DE VAUX was desired to bring in such papers, as he should think fit, and order should be taken to have them fairly copied into a book by themselves, that they might be perused; and that the papers, after having been copied, should be safely delivered to him again.

There being a discourse about the necessity of having some conveniences for making the experiments of mixtures of metals, Mr. HENSHAW promised to give a small pair of smiths bellows, which he had by him.

The experiment of tin and copper was desired to be made at the next meeting.

Mr. HOOKE read an account of the experiment, which was made the Monday before by Mr. HILL, Dr. CROWNE and Mr. HOOKE, which was ordered to be entered into the register, as follows:

" *February* the 2, 16<sup>55</sup>; the several weights of lead and tin, and a mixture made of equal parts of lead and tin melted together, were examined; and the proportions taken as followeth:

" Lead, weighed in the air, was	— — — —	3450 grains.
" Tin, weighed in the air, was	— — — —	3450 grains.
" Lead, weighed in water, was	— — — —	3138 grains.
" Tin, weighed in water, was	— — — —	2988 grains.

" The aforesaid equal parts of lead and tin, being melted into one mass in a crucible, and being then examined, we found that,

" This mixture weighed in air	— — — —	6876 grains.
" The same weighed in water was	— — — —	6078 grains.

" Whence the specific weight of the metal compared with water, was 8<sup>2</sup>/<sub>11</sub>.

<sup>b</sup> Vol. 5, p. 216.

" The

" The specific weight of lead, as above — — — — —  $11\frac{6}{100}$   
of tin — — — — —  $7\frac{1}{100}$ "

" Whence the specific weight of this mixture should have been —  $9\frac{11\frac{6}{100}}{100}$ "

It was desired, that trials should be made, between that and the next meeting, with mixture of tin and copper, tin and silver, silver and lead, and silver and copper: and that the time of making some of them should be on the Monday following at three in the afternoon; and that any member of the society, who pleased, might be present.

Mr. Hooke produced a letter from monf. JUSTEL, which he had received that afternoon, though dated at Paris 23 December, 1679<sup>a</sup>. It was read by the president. It contained an account of an artificial man and an artificial horse, and of a machine for transporting earth. Dr. GALE was desired to send an answer to it, with directions to him how to convey his letters.

Upon this it was discoursed what kind of information Dr. GALE should send to the correspondents, and it was resolved, that he should receive directions at the next meeting.

The two secretaries were appointed to have keys of the press, in which the society's books and papers were kept, and no person else.

Dr. Hooke shewed an Indian fig or prickly pear from Bermudas, which was opened, and the deep red juice thereof tasted by several of the members.

Dr. PAPIN shewed an experiment in the exhausting engine, whereby, he affirmed, that a liquor inclosed in the exhausted receiver, extracted a tincture from red wood much sooner and stronger than the same liquor in another glass in the open air would do in the same time.

*February 12.* Mr. HENSHAW Vice-president in the chair.

A letter from Mr. HYDE of Oxford to Dr. CHARLETON was produced by Mr. COLWALL and read, giving an account of some observations of his about moths, &c. as also concerning the generation of oysters; which letter was as follows:<sup>a</sup>

" In the first place I present to you the little inclosed paper, which contains  
" three or four embryos of moths: for every one of those little things hath a  
" worm in it. If you observe upon hangings in chambers, you shall see in some  
" places the nap or wool sheared off, that the place is left bare the breadth of about  
" half a crown piece; and very near that bare place you shall see one of these  
" things sticking upon the cloth, like a little roll of lint or flock, which is always  
" of the same colour with the cloth or hangings, from whence it was sheared off.

<sup>a</sup> Letter book, vol. 8. p. 88.

<sup>a</sup> Letter book, vol. 8, p. 89.

These, which I have sent, are partly red and blue, because I took them off from a Turkey carpet, which had such colours in it. I suppose, that at the end of summer the old moth lays her worm or seed, and gives it this artificial covering to preserve it against the cold winter. As also the green beetle, which we call a rose-fly (because they love to be upon roses) doth not only earth itself half a foot deep in the spongy ground of beds in gardens, but those, which do not happen upon that convenience, do find out another shift: for example, of the house of a man, who made baskets and other things of twigs, the floor of his house being hard earth, was covered with the sheds and refuse matter of small twigs as if it had been strewed with rushes, under which lay many of these roses, each of them being inclosed in a case of earth, which covered his whole body totally. These cases, when broken, are perfectly smooth within, but the outside was rugged. My wonder is, by what art the fly could cement this earth so as to make it stick together, and secondly how it could close itself within, so that the case should be perfectly shut up on all parts. These things I did, some years ago, present to Dr. COMPTON, bishop of London, for his friend Mr. MARSHAL of Winchester, who hath been the most curious observer of insects, and hath often spoke of printing a large volume about them.

Concerning the generation of oysters, I lately observed sticking upon some of their shells little knobs of matter between white and yellow, which, if you mark it well, are so many knots or clusters of young oysters, which I have viewed in a magnifying glass, and found one side convex and rugged, and the other inclining to concave, as is the figure of an oyster. Within each little particle of the cluster was water mixed, with some more fat and unctuous matter. I suppose, that about December the oyster spawns, and that by the sides of her shell issues out the matter, which is for generation of the young brood: which being issued out sticks upon her shell, and is there nourished up for a time, till either nature or the tossing of the sea separate them. I suppose them to begin breeding about December, because at the beginning of this present January I found these clusters so far grown, as to be perfectly formed to their shape outwardly, with fluid matter within them without form; there being also sticking to the same shell some of perhaps the former year's breed, as big as six-pences, whose shells were perfectly hard, and some pretty little meat within them, whose shape was perfect within, in all points. If you please to mind it, doubtless you may find many of them in any parcel of oysters.

Those things, which we call crabs-eyes (which, for want of true ones, the apothecaries sometimes make into that form out of powder of egg-shells) are found in the little prawns or crabs at the time of spawning: for I found them when they had the little round particles of their seed or young ones sticking in their posteriori. But those things called crabs-eyes are only in the male fish, such whereof I saw two of them in his head, standing on the edge, like a couple of millstones or wheels. Hitherto you have my own experience. But I have been informed concerning the little fishes called bleaks, that the reason, why they leap above water at Midsummer, is not to catch flies, but because they are at that time of the year troubled with a little worm in their guts: which may be inquired into better at summer. I have been also told, that the butter-flies

" are bred of the caterpillar, which in summer is green upon the leaves, and  
 " at winter grows hairy and hirsute, bodying themselves (as I have seen) all  
 " the winter in a strong cobweb of their spinning, hanging within a bush in any  
 " hedge: but whether at spring these hirsute creatures come to be butter-flies,  
 " may be easily found: for my part I doubt it, &c."

BUT Mr. HENSHAW was of opinion, that Mr. HYDE was mistaken in his notion, that the oyster by some means conveys it young so, as to make them stick on the outside of its shell; for that those young shell fish, that stick upon the backs of oysters, were for the most part of another kind, as the counter-fishes and the aurismarina, &c. and that when many oysters chance to cleave to the shell, he conceived them to be cast there from some other spawning oyster.

A letter from Mr. LEEWENHOECK to Mr. HOOKE, translated by Mr. ASTON, and dated at Delft 13 February, 1680, N. S. was read, acknowledging the receipt of the last letters and books sent him, and expressing his desire to be chosen a member of the society; and mentioning, that he was busy in making two observations, which he promised to transmit to the society.

Dr. GALE was called upon for the diploma directed at the meeting of January 29 to be sent to Mr. LEEWENHOECK; and it was ordered, that the society's seal should be affixed to it, and that a silver box should be provided for it.

Mr. HOUGHTON presented the society with several prints of the line of the Norfolk family, as also the copper plate itself, whereon it was engraven, and a pane of glass, on which the picture of the first duke of Norfolk was drawn; all which Mr. HOUGHTON had procured from his uncle, Mr. SILVANUS MORGAN.

Mr. HOOKE read his account of the experiment, which had been made on the Monday preceding, of melting silver and tin together \*:

" Monday February 9, 1670, half an ounce of refined silver (the specific gravity whereof, to water, was found to be as 9 $\frac{1}{2}$  to 1) was melted in a crucible in a charcoal fire, in about half a quarter of an hour; and then an equal weight of block-tin was thrown into it, which immediately melted like butter, but cooled the silver. Blowing the coals again, the whole mass melted and incorporated, but there seemed a great deal of dross at the top. Then we took out the crucible, and suffered it to stand till it was almost cold: then turning up the crucible upon a sheet of paper, a great deal of powder and scoria and some pieces of metal, which though it were so cold as not to burn the paper, yet was it so soft, as to temper and spread with the point of a knife like an amalgama of mercury and tin: but breaking the crucible, we found a pretty quantity of metal at the bottom. We picked out as much as we could of the mettlic, and to make it in a lump, we melted them in another crucible, which it presently did, and poured it into water; this lump of mettlic we weighed, and found it to weigh in the air 173 grains, and in the water 157 grains; whence the specific gravity

\* Register, vol. 5, p. 217.

“thereof is  $10\frac{1}{2}$ , somewhat more than  $10\frac{1}{2}$ . So that by the mixture of an equal weight of tin, whose specific gravity to water is but as 7 to 1, the silver is made above the tenth part heavier.”

The metal being shewn to the society, and by a blow of a hammer broken before them, it was observed to be very heavy, close, hard and brittle.

The experiments of gold and silver, and lead and silver, were desired to be made on Monday following at two in the afternoon in the repository.

Mr HENSHAW read a paper of Dr. PAPIN, being proposals of some experiments, which he could shew with spirit of wine mixed, both with fresh water, and salt-water, and then put into the exhausting engine, where sometimes the mixture with fresh-water would yield most bubbles, and sometimes the mixture with salt-water. The paper was as follows:

“Ardent spirits and particles of salt being two of the most active substances in our bodies, I thought it would be good to try something about them, in order to the discovery of the effects they can produce, when they are mixed in our veins and arteries. Therefore I took first common water in one bottle, and salt-water in another bottle, and having put them both together *in vacuo*, I found, that common water would bubble more than salt-water. So it seemed, that pouring equal parts of brandy into each bottle, there should not follow so much ebullition in the bottle with salt, as in the bottle without salt. Nevertheless, when I came to try that, I found, contrary to my expectation, that the ebullition began sooner, and was greater in the bottle with salt, than in the other; which I thought to proceed from the mutual working of the particles of salt and ardent spirits upon one another. And this might be the reason, why drunkards love salt meat, because some particles of salt remaining in the organs of the taste, when they are wrought upon by the wine in drinking, they make a tickling motion, which causeth the sensation of a pleasing taste.

“Now because acids and alcalis, after they have done working, are mortified and deprived of some qualities they had before, I would try, whether spirit of wine would be mortified too, by the particles of salt, and deprived of the quality it hath to boil *in vacuo*, which hath been discovered many years ago by Mr. BOYLE. Therefore I poured two equal parts of brandy into two bottles, and I mixed with one twice as much salt-water, and with the other twice as much common water: these having been well stirred and kept seven hours together, I put them both *in vacuo*, at the same time; but I found, that then the working of the particles of the salt with the ardent spirits was stronger than when they are newly mingled; the mixture with salt bubbling up a great deal sooner than the other. Therefore I took out both the bottles, and having kept them seven or eight hours more, I put them again *in vacuo*; and then I found at last, that the spirits were much mortified by the salt; because this time the mixture without salt bubbled up much sooner than the other did.

<sup>4</sup> Register, vol. 5, p. 218.

“From

" From this I gueſs, that ſalt and ardent ſpirits are antidotes againſt one another ;  
 " and that ſalt meats may be good to thoſe, that drink ſuch liquors, as are apt to  
 " give many ardent ſpirits.

" The working of thoſe ſubſtances may be haſtened in our bodies, by reaſon of  
 " the heat : it might be haſtened too, by uſing ſpirits of ſalt inſtead of ſalt it-  
 " ſelf: for I remember, that by an experiment made at Mr. HUYGENS's, and print-  
 " ed in the year 1674, we found, that aquafortis doth preſently mortify ſpirit of  
 " wine.

" By proſecuting ſuch experiments, I think ſeveral other ſubſtances could be  
 " found to be antidotes againſt one another; but I ſubmit all to the judgment of  
 " the Royal Society."

Dr. GALE produced his draught of a diploma for Mr. LEEWENHOECK.

The ſociety, it being late, would not ſtay to ſee the experiment, which was  
 ready; but the minutes of the laſt meeting being read, adjourned.

*February 19.* The preſident in the chair.

The minutes of the 12th inſtant were read, wherein mention being made of Mr.  
 HYDE's letter, it was deſired, that Dr. GALE would take this opportunity to write  
 to him on the ſubject thereof.

Upon mention of Mr. LEEWENHOECK's diploma, it was ordered, that the arms  
 of the ſociety be engraved on the ſilver box to be provided for the diploma.

The preſident deſiring to ſee the things preſented at the laſt meeting by Mr.  
 HOUGHTON, the prints were brought in and diſtributed one to each member; and  
 Mr. HUNT was ordered to paint upon the frame of the painting on glaſs the name  
 of the donor, Mr. MORGAN.

Mr. LOCKE read an account of ſome experiments made on the Monday preced-  
 ing upon a mixture of ſilver and lead; which account was ordered to be entered  
 in the regiſter-book\*, and was as follows:

" Monday February 16<sup>th</sup>. We found by trial, that the ſpecific weight of ſilver  
 " was 9 $\frac{1}{2}$ , and that the ſpecific weight of lead, examined by water, was 11 $\frac{1}{2}$ ; and  
 " by melting half an ounce of ſilver and half an ounce of lead together, and weigh-  
 " ing the mixture firſt in air, then in water, we found the weight of it in the air to  
 " be 439 $\frac{1}{2}$ , and the weight of the ſame in the water to be 397 $\frac{1}{2}$ : whence we  
 " deduced, that the ſpecific gravity thereof was 10 $\frac{1}{2}$ : and by comparing it with  
 " what it would have been, ſuppoſing an equal mixture without penetration, we  
 " found it ſhould have been 10 $\frac{1}{2}$ , ſo that it was found ſomewhat lighter than  
 " the medium of their two ſpecific gravities, which we ſuppoſed to be cauſed by

\* Vol. 5, p. 219.

“ the wasting of some part of the lead into litharge. So that it seems in this composition the metals do not work upon and penetrate each other, as in some of the other mixtures.

“ Then with a hammer and anvil we beat this mixture very flat, to see if by the strokes of the hammer they could be made to penetrate each other, or to lie in a closer texture: but weighing the piece so hammered, first in air, and then in the water, we found the weight thereof in both cases the same with the former weight. It was very malleable, and seemed of a middle nature, as to hardness and malleableness, as it did also as to its colour between silver and lead.

“ After this we put the same lump into the same crucible, and suffered it to stand in the fire melted, till all the lead was thrown out of the silver into a litharge, which remained melted at the top, and was converted into a glass, somewhat yellowish but transparent, and which was very brittle. But it was observable, that so long as there remained any lead with the silver, it kept the same in fusion, though the fire was not very strong: but so soon as it was all boiled out into litharge, the silver grew hard, though the litharge remained melted into a glass; which we poured out into a cake.

“ Examining the comparative weight of this glass of litharge to water, we found the specific gravity thereof to be  $6\frac{2}{11}$ , that is near  $6\frac{1}{2}$ . So that lead reduced into glass hath acquired a texture twice as much rarefied, as it was whilst a metal.

“ Examining the specific gravity of a lump of glass between white and green, we found it to be to water as  $2\frac{2}{3} + \frac{1}{11}$ : so that this glass of lead is almost three times as heavy as common glass.”

The experiments to be tried on the Monday following at three in the afternoon were appointed, viz. 1. With silver and gold. 2. With silver and copper; and 3. with brass and lead.

Mr. PACKER gave an account of the way of converting lead into litharge, by skimming the melted lead with a skimmer.

The glass, which had been made out the lead boiled out of the silver, was shewn, and the weight of it given, compared both to lead, common glass, water, &c.

Mr. HENSHAW gave an account of the way of making putty of tin and lead calcined.

Two books brought by Mr. AUBREY from Mr. WILLIAMS were presented to the Society. They were sent by JOHN BRUMSTEIN, M. D. second physician to their highnesses the prince and princess of Orange, and had been sent him by Mr. J. SWAMMERDAM for this purpose, as appeared by a note inclosed.

Dr. PAPIN

Dr. PAPIN shewed an experiment with the exhausting engine, the account whereof he delivered to the president, which was ordered to be registered<sup>a</sup>.

Dr. CROUNE related, that the fetid flegm remaining after the spirit of Canary had been extracted by distillation, could not be sweetened by any method so well as by pouring on it fresh Canary, which did it immediately.

Dr. KING shewed a pair of microscopes conveniently contrived to screw together, which, he affirmed, would do as well as any larger microscope.

Dr. GALE was desired, that he would in his letter to Monf. JUSTEL request to be informed, as much as might be, of what was known concerning the effects of the poison so much spoken of in France.

Mr. HILL gave some accounts of the poisoning, that was so much practised in Rome and Italy in the year 1656.

Mr. HENSHAW added, that the report of that Italian poison was, that it was not discernible by smell or taste, when it was mixt either with meat or drink : That it was said to be some preparation of lettuce : That the symptoms of it were, that the person soon after taking it grew drowsy : That after sleeping he awaked with a shivering like an ague, with a great dejection of spirits : That if he were let blood, he died presently : If he took cordials, he fell into a high burning fever, that carried him off in two or three days : And that the antidote against this poison was vinegar or juice of lemon.

Dr. CROUNE mentioned, that the grand duke of Tuscany being sent to by the king, to know what that poison was, which was reputed so very mortal, returned a bottle of the fetid oil of tobacco, and said, that he knew no poison greater than that.

Mr. PERKINS gave some account of some observations, which he had made about the variation of the magnetical needle ; of which a more full account was expected at the next meeting.

*February 23, at a meeting of the COUNCIL were present*

The President,

SIR WILLIAM PETTY  
Mr. HENSHAW  
Mr. COLWALL  
Mr. HILL

Dr. HOLDER  
Dr. GREW  
Dr. GALE  
Mr. HOOKE.

It was ordered, that the treasurer do pay to Dr. POPE for the use of his lodgings so much rent, as should be found due since the last payment to the time, when they were delivered back to him : And,

<sup>a</sup> It is not entered in the register.

That

That Mr. HUNT prepare a silver box for the diploma to be sent to Mr. LEWENHOECK.

Dr. GALE was desired to get a table fairly written with the inscription now produced by him, acknowledging the noble bounty of the duke of Norfolk in bestowing the Norfolkian library on the Society; the said table to be hung up in the gallery, where the said library is placed.

It was moved, that the duke of Norfolk should be solicited to bestow his picture to be preserved in the library.

Mr. COLWALL was at the same time desired to bestow his picture upon the Society, to be kept constantly in the repository; which he, though with much modest reluctance, promised to do.

It was ordered, that there shall be provision made for all the manuscripts of the Norfolkian library.

Dr. GREW read a proposal of his about procuring subscriptions for encouragement of his undertaking to print a catalogue of the natural and artificial curiosities of the Society; and he was encouraged to bring in his proposals on the Thursday following for subscriptions.

The matter of the new diurnal to be printed in half a sheet of paper was debated: And it was resolved to meet upon this matter on the Saturday following, February 28, at ten in the morning.

Mr. BATES's bill for the partition in the gallery was past.

February 26, at a meeting of the SOCIETY, the president in the chair.

Mr. FIRMIN was admitted fellow.

Mr. HOOKE presented from Mr. BOYLE his *Sceptical Chymist*, lately reprinted by him with many additions; which treatise the committee for experiments were desired to peruse, and to give an account of to the Society, and to see what experiments contained therein were proper to be shewn at the meetings of the Society.

The committee of experiments were Mr. HILL, Mr. COLWALL, Mr. HENSHAW, Mr. EVELYN, Mr. ASTON, Dr. GALE, Dr. CROUNE, Dr. BROWN, Mr. HOOKE, and Mr. PERKINS. They were desired by Mr. HOOKE to meet upon the Monday following in the afternoon, when he designed to try some experiments of weighing.

The president presented from Dr. BECKERUS a book of his lately published, and dedicated to the Society, intitled, *J. J. Beckeri de novâ temporis dimetiendi ratione & accuratâ horologiorum constructione, theoriâ, & experientiâ, ad Societatem Regiam Anglicanam in Collegio Greshamensi Londini.*

Mr. FLAMSTEAD gave an account, that he had perused the book, and conceived, that there was very little in it, that was significant for the design, which it was intended for; that the alteration by rarefaction and condensation would do more harm than good: And that he thought, that if the author had applied the barometer, it would have been more significant.

Mr. HOOKE mentioned, that one part of the design, viz. the taking off all inequality of force from the pendulum, had been long since completed and shewn by himself before the Society, when they met at Arundel-house, as would appear from their registers: That this author had only asserted, that there was such a way, but had not shewn what his way was: and that some other of the ways, which he had there proposed, appeared to be much inferior to those already practised.

Mr. FLAMSTEAD was desired to bring in an account of his observations about a spring tide, that had lately happened; which he promised to do.

He gave an account in writing of an observation, which he had made with the Society's needle at the observatory at Greenwich, viz. that it varied about  $4^{\circ}$  or  $4\frac{1}{2}^{\circ}$  degrees at most to the west.

Mr. HOOKE gave an account of the trials made upon the Monday preceding, as likewise of the method, which he had made use of to adjust the weights for succeeding experiments by dividing extended wires, &c. into grains, half grains, quarters, and eighths: And he mentioned, that he would by those examine the weight of gold, silver, copper, tin, lead, &c. and on the Monday following make the trials.

Hereupon several discourses were occasioned about the nature and temperature of simple and mixt metals; and particularly of the metal, of which the holes, through which wire is drawn, are made; which, Mr. HOOKE said, he had been informed, was made by one man only, and not known to any other person.

It was desired, that one of those plates with holes should be procured against the next meeting.

Mr. HENSHAW mentioned, that the way of hardening and tempering tools for cutting porphyry was by quenching them in the distilled water of branca urfina.

Mr. HAAK produced an extract of a letter from a learned gentleman at Nuremberg, dated 24 January 1671, containing an account of a strange observation made on a dead corps, which appeared covered with red hair. He was desired to inquire farther concerning it; and the extract was ordered to be registered, as follows:

"We have nothing curious here now worth imparting, unless you will permit a late accident in this town to supply the defect; viz. That there being an occa-

<sup>1</sup> Register, Vol. v. p. 224.

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"fion

" sion to enlarge a burial-vault in one of our church-yards, the workmen lighted upon a corps buried there twenty and odd years ago; which, the coffin being opened, did appear to be all over from top to toe (or from the head to the soles of the feet) thick overgrown with hair, of a red colour, and to the touch, at first soft and smooth, but after it was a little while exposed to the air, much harder and rougher than bristles."

Upon mentioning the observation, that the hair was first very soft, and afterwards hardened in the air, Mr. Hooke remarked, that the of silk-worms, spiders, caterpillars, &c. which in the body were soft, so soon as they were drawn into the air, hardened into a thread.

Dr. TYSON upon this occasion mentioned a strange observation of his, of hair found in the ovarium of a woman, who lately died; which hair he also shewed. He remarked also, that he had found something like it in the ovary of a bitch. He was desired to bring in an account thereof in writing.

Mr. PERKINS read an account of some observations, which he had made on the variation of the magnetical needle, which he said varied in several inclinations, inasmuch that he could make it stand due east and west. This account was ordered to be registered, <sup>k</sup> as follows:

" The south end of the horizontal needle or compass being made to dip (in this northern hemisphere) will cause the needle to vary, and that more or less according to the dipping; so that when made to incline about as much as is the complement of the natural inclination of the place, it will stand east and west; and if dipt a certain number of degrees more, the south end will wholly turn and stand north, and the north end south.

" The variation is either natural or accidental: the natural is constantly regular and uniform.

" The accidental is either from the guns and iron work of the ship, according as it lies nearer or further off, higher or lower, in greater or lesser quantities; and that either cast or hammered, clean or rusty and foul, &c. and according to the tack or set of the ship: So that the compass upon one tack may have four degrees variation, on another 3°, &c. according as the north or south end comes to be inclined towards such and such a mass of iron, and that lying aloft or below, &c. Also according to the warping of the card or needle, and strength of the virtue now on the wire, or that was given by the touch at first, and truth of its horizontal set: also somewhat acuity or bluntness of the pin that bears the card, &c.

" To which may be added the faults in observation and computation, as the not regarding of refraction, and the true centre of the sun or star, and erroneousness of the tables of declination.

<sup>k</sup> Register, Vol. v. p. 221.

<sup>l</sup>

" The

"The natural variation is from the natural inclination or dipping, and the accidental variation from the accidental dipping.

"Hence, the natural inclination being greater and greater, as nearer and nearer the pole, the less deviation from horizontality causeth a great variation: So that when as 2 or 3 degrees dipping under or near the æquinoctial may cause but 1 degree variation; as much dipping in 50 degrees latitude may cause 5 or 6 degrees variation."

Mr. PERKINS shewed also an experiment with a dipping needle, whereby he endeavoured to prove his theory, viz. by making the dipping needle incline in a line in a north and south position.

Mr. HOOKE objected, that though a dipping needle would vary from the meridian, according to various inclinations in several azymuths, as he had long since found, and reduced to a theory; yet he conceived, that the leading or poising a horizontal needle to such an inclination would not have the same effect; and therefore he doubted, whether that would succeed. But Mr. PERKINS and Mr. FLAMSTEAD both affirmed, that the variation would be much the same. Mr. PERKINS desired to be informed of as many variations of the magnet, as could be procured, that he might make a theory of the variation. He said, that he had found by observation, that there were six meridians, in which the needle did not vary, three in the north, and three in the south; and that one of these went now through St. Helena.

Dr. HOLDER acquainted the Society, that the present governor of Newfoundland was well known to him; and that if the Society had any commands or inquiries for that country, he would recommend them to that governor's care.

Mr. HOOKE produced a large discourse about insects, being a translation of the principal things contained in Dr. SWAMMERDAM's book. But it being now eight o'clock at night, the Society rose.

*February 28*, at a meeting of the COUNCIL were present

The President,

SIR CHRISTOPHER WREN  
SIR WILLIAM PETTY  
Dr. HOLDER  
Mr. HILL

Mr. COLWALL  
Dr. GALE  
Mr. HOOKE.

The heads of the Philosophical Gazette were discoursed of, and some of them set down.

Mr. HOOKE was desired to make a trial of one.

*March 4*, at a meeting of the SOCIETY, the president in the chair.

The president read the rules (now fairly ingrossed in a sheet of pasteboard) which were ordered by the council for the method of proceeding at every meeting of the Society for the future; and which were ordered to lie always upon the table at the said meetings; and the person in the chair was desired to see, that they be observed.

The said rules were also to be produced at the next meeting of the committee of experiments; at which meeting the said committee were desired to consider, what authors, who had written of matters pertinent to the business of the Society, shall be first considered, and of the persons proper and at leisure for perusing the said authors, and making extracts of them; and to recommend the said authors to the persons so fixed upon.

The time of the meeting of this committee was appointed to be the Tuesday following in the afternoon in the repository; and Mr. HUNT was ordered to give notice to such of them, as were not then present.

The minutes of February 26 were read; whereupon the matter of Dr. BECKER's book was discoursed of; and because it was thought, that all that Mr. FLAMSTEAD had said concerning that book was not entered in the journal, he was desired to bring in his account of it in writing at the next meeting.

Mr. PERKINS supposed, that the driness and moisture of the air was a greater cause of the variation of the pendulum clocks than the heat and cold.

Mr. HENSHAW was of opinion, that the heat and cold might alter them considerably, since the air itself in cold countries seems to freeze and cover all things with a frost.

Mr. PERKINS supposed, that the standing of the Dutchman's clock in Nova Zembla might proceed from the foulness or rust thereof.

Mr. COLWALL gave an account, that Mr. HYDE was well pleased, that the Society had the perusal of his letter; offering to assist them by communicating any thing, that he should meet with proper for their design.

Mr. HOUGHTON produced a plate for drawing of wire, not yet drilled; as also a broken piece of another wire-drawing plate, which had been used; and a piece of mixed metal of the colour of gold, which would not cost above 5 s. a pound; which, it was desired, might be examined by weighing to find the specific gravity on the Tuesday following, and then returned to Mr. HOUGHTON.

He gave likewise an account of the weighing of two bullets, the one of lead, the other of tin, cast in the same mould, and of the difference of their gravity in air and water; and produced the bullets to the Society. He farther gave an account from a silversmith of his observations on the wire-drawing plate, which was to this effect; that this metal breaks whiter than steel: That it is believed, that there  
is.

is some silver in it, and no iron; perhaps some steel: That it is made at Lyons in France, and nowhere else: That it is prohibited upon the severest penalties to . . . . : That being heated quite red hot makes no variation in its temper: That there is no way to soften it but by working: and that prince Rupert had tried to make it, but without success. Mr. HOUGHTON was desired to inform himself farther concerning it, and to bring in a large account thereof in writing. Mr. PERKINS desired to be informed how it rusted.

Mr. HOOKE gave an account of the same metal; that it could be both hardened and softened by heating and quenching: That it was supposed to be some preparation of steel: That the great use of it was for drawing gold, silver, and copper wire, &c. That steel wire could be drawn through plates made in England of steel not hardened; but that these plates were apt to fret the wire of softer metal: That he would make some trial of this metal, by which he hoped he might give some more certain account what the metal was; which he was desired to do.

Hereupon some discourse was occasioned about finding out some cheap metal, that might be hard and tough, and not rust; which would be of good use as well for sheathing ships, as for other occasions.

Mr. HILL related, that a ship was sent to Muscovy about 130 years before, which was sheathed with lead; but from the rusting of the nails it was left off: And that the inconvenience of the rusting of the copper nails was the cause of the present disuse of it in the navy.

The president remarked, that it was very desirable, that the journals of all voyages made by sea should be procured by the Society to be perused, and what was considerable extracted for use, as from the East-India Company, Trinity-house, &c.

Mr. HOOKE inquired, whether any person present could give any information concerning a certain English earth very effectual for scouring copper, brass, &c. but none having before heard of it, the members were desired to inform themselves farther concerning it: And Mr. HOUGHTON promised to inquire of some, who, he thought, could inform him.

It was moved by the president, that Mr. PITT should be desired to attend the next meeting about giving security.

The trial on the Tuesday following, promised by Mr. HOOKE, was of copper and silver.

The president took with him the diploma for Mr. LEEWENHOEK, and presented the Society with a screw-press for sealing such diploma's.

Upon the objections made by Mr. HOOKE to the inferences made at the last meeting by Mr. PERKINS from his experiments shewed with a dipping needle variously

riously inclined in the north and south azymuths, that the compass needle would also vary, if the south end thereof were made to dip; Mr. PERKINS explained what he meant by the north end of the dipping needles pointing southwards beyond the equator.

Mr. HOOKE also explained those experiments, and shewed, that there was nothing in them, which varied from the known magnetical rules; and shewed the reason of the directing of the dipping needle towards other places than it would naturally do, if it were not limited and restrained: and that in this restraint it did, as near as it could, place itself in its most natural posture: That this had no manner of influence upon the common compass needle, whether it hung horizontal, or whether the south or north end dipped below it. And because there were some misunderstandings about the names of the north and south ends of the needle, Mr. HOOKE explained what he meant by pointing northwards and southwards, viz. towards any point of an hemisphere, or the north or south side of the east and west azymuth; which he made more intelligible by a draught, whereby he shewed also the manner of the dipping of the needle below the horizon.

Mr. PERKINS brought in the magnetical needle made by the direction of the Society, and at their charge; and the latter part of the inscription engraven on it by Mr. WYNN was ordered to be taken out, since that needle was only made for the use of the society, where-ever they pleased, and to be kept always in the repository.

Dr. GALE moved, that the Society's instruments at the observatory at Greenwich might be brought back to their repository.

Mr. JONAS MOORE was proposed candidate by Mr. HOOKE.

Rarities procured by Mr. HOOKE from ——— WHISTLER, Esq; and presented to the Society for their repository, and delivered this day to Mr. HUNT.

1. The skin of an orbis-ritunatus.
2. The snout of a priftis or saw-fish.
3. The core of a gazell's horn.
4. A large turtle's head.
5. A very large Molucca crab.
6. Two tropic birds.
7. The head of a seal or sea-calf.
8. The pizzle of a sea-horse.
9. The fin of a shark.
10. A shark's jaw.
11. The tail of a dolphin.
12. A dried gurnet.
13. Several pieces of coarse white coral or petrified substances.
14. A sea-fan.
15. A decayed bird of Paradise.

16. Some

16. Some shells.
17. An helmet-stone.
18. A West-Indian feather-cap.
19. An East-Indian shield made of canes.
20. An East-Indian fan.
21. A pair of China stiliards in a case.

On this day, there was read and entered into the register<sup>1</sup> the following account of an experiment of the weight of gold and silver melted together, by Mr. Hooke:

" Monday March 1, 16<sup>2</sup>/<sub>3</sub>. The weights having been before, with very great care and curiosity, adjusted, so as to be all in a true proportion to one another, and every thing being well adjusted and fitted for the trials; we examined the weight of the gold (which was of the best refined water-gold) and found the same in the air to be counterpoised by \_\_\_\_\_ 109<sup>1</sup>/<sub>2</sub> grains.  
 " In the water 'twas counterpoised by \_\_\_\_\_ 103<sup>1</sup>/<sub>2</sub> grains.  
 " The specific gravity as to water was as 19 to 1.

" We examined the weight also of refined silver by the same weights, and found it in air to be \_\_\_\_\_ 109<sup>1</sup>/<sub>2</sub>.  
 " And in water \_\_\_\_\_ 98<sup>1</sup>/<sub>2</sub>.  
 " Whence the specific gravity to water is as 10<sup>1</sup>/<sub>2</sub> to 1.

" Then we melted them together and let them cool, and weighing the mass in air, we found it \_\_\_\_\_ 215<sup>1</sup>/<sub>2</sub> grains.  
 " And in water \_\_\_\_\_ 199<sup>1</sup>/<sub>2</sub> grains.  
 " whence the specific gravity to water was as 13<sup>1</sup>/<sub>2</sub> to 1. But the medium of the specific gravities of the gold and the silver was to water as 14<sup>1</sup>/<sub>2</sub> to 1. Therefore the mixture was lighter than it ought to have been, according to the supposition of ARCHIMEDES by  $\frac{1}{11}$ , that is somewhat more than a twelfth part.

" Then with a chissel we cut the lump in two, and found the middle part of it look pretty yellow like gold, as if the gold had not been all perfectly mixt with the silver, though the silver encompassed it. We melted it therefore again in the same crucible, and when cool, weighed it and found its weight in the air 215<sup>1</sup>/<sub>2</sub> grains, and in the water 199<sup>1</sup>/<sub>2</sub> grains; whence its specific gravity was much the same as before, viz. 13<sup>1</sup>/<sub>2</sub> to 1.

" Then we cut the lump in sunder with a chissel as before, and found, that the mixture was perfect, and the colour of the gold wholly lost."

There was likewise entered the following paper."

" December 19, 1676, hor. 8 hours, 9 min. 0 sec. in the morning, the sun's following limb was in the same azimuth with Eltham steeple.

<sup>1</sup> Vol. 5. p. 222.

<sup>2</sup> Vol. 5. p. 223.

" His

" His true azimuth from the meridian at this time by calculation found 51 deg. 15 min. East = to the angle EOM.

" The angle subtended betwixt Eltham steeple and the windmill at Bromley at the observatory on Saturday last 48 deg. 15 min.  $\frac{1}{2}$  = EOB.

" Therefore the azimuth of Bromley windmill B from the meridian Eastward BOM 3 deg. 0 min.

" But the azimuth of Bromley windmill from the magnetical meridian taken yesterday was one degree, or at most  $1\frac{1}{2}$  to the Westward BOM.

" Therefore the variation MOM 4 deg. 00 min. or at most  $4\frac{1}{2}$  degrees Westerly in the North, to the East, in the South point of the compasses, by the equilibrated needle, one foot long.

" February 25, 1673, in the observatory at Greenwich."

March 11, the president in the chair.

The minutes of March 4th were read, which gave occasion to discourse farther concerning useful mixtures of metals, and particularly of such, as would not suffer rust from the air or salt water: and it was propounded to be tried, whether iron, copper, or brass nails being dipped in tin or lead, and well covered therewith, would not secure them from being rusted and eaten by the sea-water; which would be of great use for sheathing of ships; since the nails now made use of were observed to be much consumed by the salt-water, and so to occasion the leaving off or not using of the new way of sheathing ships with melted or rolled lead.

Hereupon it was queried, whether experiments of this kind could be well made here, in England, since the sea-water in hotter countries might be more powerful for that effect than here: but it was supposed, that a strong brine kept warm might be made more powerful here than the sea-water in hotter countries.

The president mentioned again the usefulness of collecting all the journals of voyages, that had been made, and had not yet been published; and urged, that some care might be taken to make such a collection.

Mr. HILL moved, that a catalogue might be made of all the relations, that have been hitherto printed, and particularly of such, as have appeared since PURCHAS published his collection.

The president desired Mr PERKINS to make that collection, which he undertook to do.

Mr. HOOKE gave an account, that upon his farther inquiring concerning the material used for scouring and polishing metals, as brass, copper, &c. he had been informed

informed, that it was called rotten stone; and that it was brought out of Lancashire, Derbyshire or Cheshire, or that way; but the particular place he could not yet be informed of. Some of it was produced, and seemed to be a light hard and gritty earth.

The account of the experiments tried on the Tuesday preceding was brought in by Mr. Hooke and read, being examinations of the weight of a mixture of silver and copper, as also of a crown-piece; which account was ordered to be registered, as follows:

"*March 10, 1670.* The weight of refined silver was examined, first in the air, and then in water; and it was found  $\left\{ \begin{array}{l} \text{in air} - 135\frac{1}{2} \\ \text{in water} 122\frac{1}{2} \end{array} \right\}$  grains, whence the gravity to water, as  $10\frac{1}{2}$  to one. Then an equal weight of copper was examined and found  $\left\{ \begin{array}{l} \text{in air} - 136 \\ \text{in water} 118\frac{1}{2} \end{array} \right\}$ , whence its specific gravity to water as  $7\frac{1}{2}$  to one. Then they were put together and melted in a crucible, and being weighed again when mixed, the mass weighed  $\left\{ \begin{array}{l} \text{in air} - 268\frac{1}{2} \\ \text{in water} 238\frac{1}{2} \end{array} \right\}$ , whence the weight to water as  $8\frac{1}{2}$  to one. But supposing a perfect mixture without penetration, it should have been 9 and somewhat more than a third. We hampered it, and found it very hard and tough, and cutting of it with a chissel, we perceived, that the mixture was not so perfectly made, but that some parts were more brown than the others: therefore we melted it again and found its weight  $\left\{ \begin{array}{l} \text{in air} - 264\frac{1}{2} \\ \text{in water} 236\frac{1}{2} \end{array} \right\}$ , whence its specific gravity to water was as  $9\frac{1}{2}$ , which is somewhat heavier than it ought to be without penetration.

"We tried also a crown-piece, and found its weight in air  $471\frac{1}{2}$ , in water  $425\frac{1}{2}$ , whence its weight to water was as  $10\frac{1}{2}$ . So that it seemed to have some lead or tin mixed with it rather than copper; it being heavier than refined silver, whereas copper makes it lighter."

Upon the mention of the specific gravity of a crown-piece, Mr. COLLINS affirmed, that there was no mixture of tin or lead in the silver minted in the tower; but that the standard silver was a mixture of 222 parts of fine silver and 18 of copper; that is, 37 silver and 3 copper, or almost a twelfth part of copper.

Mr. POVEY moved, that Mr. SLINGESBY, the master of the mint, might be desired to inform the Society more particularly of this matter: and it was desired, that Mr. POVEY would speak to him for that purpose; and that Mr. HOARE, comptroller of the mint, might also be spoken to on the same account.

The experiments for the Tuesday following propounded by Mr. Hooke were appointed to be on the mixtures of iron and tin, and iron and lead.

Mr. HOOKE gave an account, that he had lately written to Mr. WILLIAM BALLE, to inquire concerning the present variation of the needle in Devonshire: and he was desired, when he wrote next to Mr. BALLE, to request an account of what experiments of that kind he had formerly made.

Dr. GALE shewed an inscription for the library to be printed in letters of gold upon a blue ground; which was approved of and ordered to be done.

Dr. TYSON read his account of the anatomical observations made by him concerning hair, &c. found in the ovary of a woman; and he presented the substances in a box, which were delivered to Mr. HUNT for the repository; and the account was ordered to be registered\*.

It was desired, that Mr. LEEUWENHOECK's long letter, translated by Mr. HOOKE, might be read at the next meeting.

JONAS MOORE Esq; was elected.

March 18, the president in the chair.

Mr. MOXON presented his fourteen *Mechanical exercises*, bound in a volume; and was encouraged to proceed in his undertaking.

Captain WOOD<sup>b</sup> was proposed candidate by Mr. MOXON.

Mr. BRIDGEMAN was admitted a fellow.

Mr. PERKINS being called upon for an account of what he had been able to do about the collection of voyages, answered, that upon inquiry he found, that the greatest number of journals of voyages were in the navy-office; and very few, or none, either in the East-India or trinity-house. He also delivered in a paper containing the titles of some voyages, which had been printed, but were scarce. He was desired to proceed with his inquiry, and to bring in an account of his progress from time to time; which he promised to do.

Sir ROBERT REDDING moved, that Mr. BLATHWAYTE might be consulted with concerning this affair, to see, what assistance he could give in this matter of voyages.

Mr. PERKINS shewed some nails cast by a founder in New-street in Shoe-lane purposely for the sheathing of ships. They were supposed to be a mixture of brass and lead. Some trials were ordered to be made with iron nails covered with lead and tin, to see whether that would preserve them from that inconvenience.

Mr. BRIDGEMAN supposed, that the journals of the East-India company of Holland might be procured, if care were taken to inquire after them.

\* It does not appear in the register.

<sup>b</sup> In the printed catalogue he is called JOHN WOOD, Esq;.

The

The president moved, that Sir JOHN NARBOROUGH and captain Wood might be spoken to for procuring of their voyages; the one to the straits of Magellan, and the other to the North East.

Mr. HILL related, that in an old map of the straits of MAGELLAN made in the time of queen ELIZABETH, the passage to the Southward of the straits was described long before LE MAIRE was said to have found it. It was desired, that this map should be farther inquired after, to see whether they were the same straits, and who made that map, and the first discovery of those straits.

Mr. HOOKE mentioned the description of the South Sea coasts made for the king of Spain; and presented to his majesty, in the possession of the earl of Bristol<sup>1</sup> at the time of his death, as he had been informed; but not heard of since that time.

Mr. MOXON said, that he had had it in his custody for some time, but had returned it to the earl of Bristol; that captain Wood might likewise have had it in his custody for some time, and might probably now be able to give some account of it. Mr. MOXON therefore undertook to make some farther inquiry after it.

A letter in latin from JOHN CHRISTOPHER STURMIUS to Mr. HOOKE, dated at Altorf 10 February, 1680<sup>2</sup>, was read, containing an account of the variation of the needle lately observed there by himself and some other curious men; as also concerning the new phosphorus or shining pills, &c. Dr. GALE was desired to return to him the thanks of the Society, and to desire him to send some of those pills, &c.

A letter from Monf. JUSTEL to Mr. HOOKE, dated at Paris 9 March, 1680, N. S.<sup>3</sup> was likewise read, giving an account of the dissection of fishes by monf. DU VERNEY, and of his curiosity in having them exactly drawn by monf. DE LA HIRE: as also an account of the poisoners at Paris, and of a new invention in Germany of printing without a press; and of a German, who had travelled over land to China. Dr. GALE was desired to return an answer to monf. JUSTEL, and to encourage him continue his correspondence.

Dr. GALE read an account of the numbing eel given to him by Mr. FLAMSTEAD: which account was ordered to be registered<sup>4</sup>. It was as follows:

“ Since I promised you an account of what I heard from Mr. Bateman, who was  
“ for more than twenty years an inhabitant and planter in Surinam in the West-  
“ Indies, concerning the numb-eel of the place, that it might be the more perfect,  
“ I have taken occasion to inquire of his acquaintance, the best merchants in this  
“ place, what report he had made them of it, and find them all agree in the

<sup>1</sup> GEORGE DICEY, Earl of Bristol.

N<sup>o</sup>. 2. p. 8.

<sup>2</sup> Letter book, vol. 8. p. 98. An extract of it is printed in Mr. HOOKE's Philosoph. Collections,

<sup>3</sup> Ibid. vol. 8. p. 107.

<sup>4</sup> Ibid. vol. 8. p. 91.

" following particulars, most of which I heard him tell his majesty and several of the nobility before he went hence for Guinea, where the last ships thence tell us he is dead.

" That as soon as the fish seizes the bait, the party holding the line finds his hand struck with a numbness, which suddenly pierces to his shoulder, and except he quit his hold immediately, thence to his heart, so that he falls down dead. That some unexperienced or forgetful persons have by this means lost their lives. But if as soon as they perceive it, they quit their hold, they recover again in a few hours.

" That himself had been struck with one in 60 fathom water, and when he had so much line out of the boat; but being forewarned of it, and quitting his line, he received no great hurt by it.

" That whatever it be, that causes this numbness, 'tis of that active subtil nature, that when some persons being struck with it have fallen, their friends, who hasten to raise them, have for their officiousness been rewarded with a sense of the same, though they have touched no part of the line, but only the body affected.

" Enquiring concerning the eel itself, they tell me he informed them it was about three or four feet long and of proportionable thickness, not unlike our eels here: that it hath this benumbing faculty only whilst alive. That when dead, it may be handled and eat too without any inconvenience. That it is very good food and commonly eaten, both by the Indians and planters, from the former of which the latter have learnt the following way of taking both it and other fish.

" The shore hath many creeks: in these, where they open into the sea, with poles and sticks they make wears, such as are sometimes seen made in other rivers, to keep the fish from getting out of the creek into the sea. Then going to the upper end of the creek in their boats or canoes, they make a faggot of a certain sort of wood they call poison-wood, and tying it up with a with-row to the ware, this wood is of that nature, that though it be not noxious to any other creature that he knew of, yet it operates so on the fish, that all soon after rise as it were intoxicated, and float on the top of the water, so that they can easily take up what they please: but the numb-eel is not to be touched, though she float amongst the rest. Here therefore the Indian companion or servant shoots with an arrow, and when she is dead, they hand her up without hurt, and feed as boldly on her as on any of the other fish. He added, that the intoxicated fish sink themselves again; and that they do not esteem what they take thus intoxicated any less than if it were taken by any other artifice.

" This is all I can learn or remember at present; but I have some hopes of a farther account from an inquisitive person, who copied several things from his mouth, and got something under his hand concerning that country and its rarities; but not much, by reason that he was no scholar, and as I understand wrote but ill, &c. Greenwich, Wednesday, March 10, 1681." There

There were likewise produced some letters of Dr. BEAL, which with the translation of Dr. SWAMMERDAM's description of the insect hemerobius, and the long letter of Mr. LEEWENHOECK, were reserved to the next meeting.

The trials on the Tuesday following were appointed to be made on iron, lead, brass, &c.

On this day, though there is no entry of it in the journal, there was given in by Mr. HOOKE the following account of the weight of several metals\*.

" Tuesday, March 16, 1679. We first examined the weight of regulus of antimony in air and water, and found the weight to be in air  $135\frac{1}{2}$ , in water  $115\frac{1}{2}$ : whence the specific gravity is  $6\frac{5}{17}$ .

" We found also the weight of common iron in air 697, in water 606 $\frac{1}{2}$ , whence the specific gravity is  $7\frac{11}{17}$ .

" The weight of the wiredrawing-plate was in air 465 $\frac{1}{2}$ , in water 399 $\frac{1}{2}$ , whence its specific gravity is  $7\frac{11}{17}$  or  $7\frac{1}{17}$ .

" The weight of the gold coloured mixture, supposed to be made of spelter and copper, was found in air 1317, in water 1166; its specific gravity  $8\frac{11}{17}$  or  $8\frac{1}{17}$ .

" Another piece examined, was found in air 1296, in water 1146 $\frac{1}{2}$ : therefore its specific gravity  $8\frac{11}{17}$  or  $\frac{1}{17}$ .

" The mixture of antimony and iron did not succeed."

1680, *March* 25. Mr. HENSHAW Vice-president in the chair.

JONAS MOORE, Esq; was admitted a fellow.

ANDREW CLENCH, M. D. \* fellow of the college of physicians of London, was proposed candidate by Mr. HOOKE: as was also ROBERT NELSON, Esq; by Mr. LANE.

The minutes of the 18th instant were read.

Upon the mention of sheathing of ships with lead, Mr. Hunt gave an account, that he had tinned some iron nails; but that it would not wholly preserve them from rust. He was ordered to make trials of them and of the other sheathing nails with urine, brine, vinegar, &c. against the next meeting.

Upon the mention of the maps of the straits of Magellan, it was related, that Sir JOHN NARBOROUGH's map thereof was printing; wherein some remarks of his

\* Register, vol. 5. p. 225.

\* Afterwards strangled in a hackney-coach, 4 January 1691; for which one HENRY HARRI-

SON was executed. See State Trials, vol. 4. p. 488. 2d edit.

were inferted, but not all; for Mr. Hooke remarked, that he had been informed by captain Wood, that upon sounding in some parts of those straits with 1000 fathom of line, he could find no bottom.

The president then came in, and took the chair.

Dr. CROUNE introduced monf. CHARRAS, who presented the Society with a printed account of the observations of Dr. JOHN BAPTISTA ALPURNUS, physician to the empress ELEONORA, intituled, *De Contagione Viennensi Experimentum medicum*, &c. together with a paper of his own, containing his thoughts and animadversions thereupon.

Dr. CROUNE discoursed concerning the ferment of the stomach, and said, that it contained a ferment and menstruum quite different from any other ferment whatsoever.

Mr. Hooke was of opinion, that a great cause of the dissolution by the stomach was a continual motion of the stomach, whereby the food therein contained was continually squeezed and churned; by which means concoctions, dissolutions, or digestions were caused, which without that motion could not be effected, either by the heat or menstruum of the stomach.

Dr. CROUNE objected much against this supposition, and said, that it did not appear, that the stomach had any motion; and that he conceived, that it was rather caused by the glandules of the stomach and guts.

The account of the experiments made on the Tuesday before by the committee for that purpose, was brought in by Mr. Hooke, and read as follows:

" Tuesday, March 23 16<sup>80</sup>. we made a regulus of equal parts of antimony and iron, and found it to weigh in the air 533 grains, and in the water 457 $\frac{1}{2}$ : whence the specific gravity is  $7\frac{1}{3}$ . This we found to be very hard, but yet brittle and not at all malleable. It broke with a short grain and black, or little reflective: it seemed not very likely to take any polish. It had no manner of operation on the magnetic needle.

" This part we melted with equal parts of tin, and found a mixture, that looked pretty white: it continued melted with a small heat, little more than red-hot. It broke into several pieces with two or three blows of a hammer; the grain of which was exceeding fine, close and smooth; and whiter than bell-metal. We polished it, and found it held a very good polish, which gave a strong reflection. Its weight in air was 859 $\frac{1}{2}$ , in water, 738 $\frac{1}{2}$ , whence its specific gravity is as  $7\frac{1}{3}$ . We conceive it may be very useful for making speculative glaſſes for Mr. NEWTON's experiment.

" Then, with another part of the regulus of antimony, we mixed an equal weight of lead, which soon incorporated together: the result was, that it made

\* See Mr. Hooke's Philof. Collect. N<sup>o</sup>. 2. p. 17.

† Register, Vol. v. p. 235.

" a com-

“ a compositum very hard and very brittle. Its weight in air was  $422\frac{2}{3}$  in the water  $365\frac{1}{2}$ : whence its specific gravity must be as  $7\frac{1}{11}$ .”

The president moved, that against the next meeting Mr. Hooke should make a table of all the experiments of this kind, that he had already tried and designed farther to try, that so that subject might be brought to a conclusion, and another be pitched upon.

Mr. HOUGHTON gave some farther account of his inquiries about wire-drawing, and promised to digest them, and bring them in to be registered.

Dr. CROUNE remarked, that he had seen the wire-drawing at E. \* \*, and that the motion thereof through the the hole was extremely swift.

The experiments appointed to be tried on the Tuesday following were mixtures of tin, lead, and regulus martis with brass.

Dr. GALE presented two papers from Mr. EVELYN, the one a letter of Mr. WILSON \* to the earl of LEICESTER \*, dated 12 August, 1568, giving some account of an unicorn's horn, and a peculiar purging China root, called macknaquam, probably mechoacan: the other was an account of the bezoar stone in Portugese. Both these papers were referred to the next meeting, together with the letters and discourses not read at the last meeting.

*April 1.* Mr. HENSHAW vice-president in the chair.

The minutes the last meeting were read, which gave occasion of some farther discourse about the way of preserving iron from rust.

Mr. HUNT produced the brass and iron nails, which were covered with tin, that had lain all the preceding week in brine, and seemed to be little altered thereby. However, it being conceived, that these nails were not so well covered with tin as they might be, Mr. HENSHAW directed, that they should be filed before they were dipped in tin, because thereby the tin would more intirely join to them, and cover them.

Upon discoursing of the great depth of some parts of the sea near the shoar, Mr. HILL related, that in the faro of Messina not far from the shore, no bottom could be found by sounding.

Mr. Hooke being asked some reason, why he supposed the stomach to promote digestion by its motion, alledged the muscular composition and make of the stomach, especially remarkable in the gizzard of fowls; and the motion, which he had observed of it in divers insects, which are transparent; as also the peristaltic motion of the guts.

\* Probably Dr. THOMAS WILSON, master of the requests, and afterwards secretary of state.

\* ROBERT DUDLEY.

Mr. HENSHAW conceived, that the gizzards of fowls were a supplement for teeth to grind and bruise their food; and that chickens and other fowls would die, if they wanted gravel in their gizzards to grind their food.

The letter concerning the unicorn's horn and macquequam root, and the paper concerning bezoar, which was translated by Dr. WHISTLER, were read.

This gave occasion to discourse concerning the unicorn; and Mr. HENSHAW observed, that no mention was made of it in any Latin author to have been known to the Romans.

Mr. LEEWENHOECK's letter to Mr. HOOKE, who had translated the sense of it into English, was read, giving an account of some farther discoveries of his about the eel-like worms in the feed of a rat; as also of the motion of the gills of muscles, oysters, &c.

It was ordered, that these should be examined at the next meeting; in order to which Mr. HUNT was directed to procure some oysters and muscles.

Dr. GALE read a Latin letter to himself from Dr. JOHN BOHN, procured by Mr. HAAK, and dated at Leipzig, 12 February, 1680, containing some new anatomical observations.

Dr. GALE was desired to answer his letter, and to encourage him to continue his correspondence: And Dr. TYSON was desired to peruse the letter, and to communicate to Dr. GALE some of his observations to be sent in his answer to Dr. BOHN.

Mr. HENSHAW read part of a letter from Sir PETER WYCHE, in which he desired to be informed, whether CRAFT, who had been in England some time before, in order to sell his receipt of the phosphorus fulgurans, had received any reward for it. Several of the members were of opinion, that he had not received any at all.

Sir CHRISTOPHER WREN then took the chair.

Dr. GALE related, that Dr. WALLIS had a design to print PTOLEMY's music.

Mr. HOOKE produced an account of the experiments made at the last day; as also a table of all the mixtures of metals, that were at first designed to be tried; but no farther trials for the next meeting were fixed upon.

Mr. NELSON, Dr. CLENCH, and capt. WOOD were elected.

April 8, the Society did not meet.

April 15, being Easter week very few members met; but Sir CHRISTOPHER WREN, vice-president, taking the chair, several letters from correspondents were read.

The first was a letter from Monf. LEIBNITZ to Mr. HOOKE dated in February 1678, at Hanover, giving an account of his prince's design of making a survey of his own country; inquiring concerning the undertakings of Dr. PELL, and especially his way of resolving equations by a table of signs; answering some propositions made to him by Mr. HOOKE, as particularly about his arithmetical instrument and the late bishop of Chester's universal character and language; hinting an invention of his, which he supposed much more useful for the improving reason; mentioning that he had by him *VAS ARCANUM LUMINIS PERPETUI* different from all other shining bodies; and inquiring concerning Mr. BERNARD, and whether our manuscripts contain more of APOLLONIUS than what BORETTUS had printed.

Upon discoursing concerning Monf. LEIBNITZ's new invention, Mr. HOOKE remarked, that he had an invention of that kind in several other subjects besides geometry and arithmetic.

The second letter was likewise from Monf. LEIBNITZ to Dr. GREW, dated at Hanover March 1678, desiring several things to be sent to him; mentioning Dr. VOLCAMER's making observations of the declination of the needle; and a book published by JOHN HALLEUS, intitled, *Innotitia ad novam & inauditam physicam*; which writer he supposes to be one, who affects mysteries; taking notice of a mass of amber found near Hanover; of a great number of small animals found in the snow of a mountain; of one BEATRIDGE, who promised a powder, that at a certain time would take fire; of a discovery of his, that the thermometer ought to be divided in a musical progression: That he had almost perfected his arithmetical engine: and that TABOR's febrifuge was made of Jesuit's bark. He inquired in this letter about dying and tinging glass red; and mentioned, that he had seen Sir SAMUEL MORLAND's but doubted his conclusion; and desired to be informed what the Royal Society was doing.

Hereupon some discourses were occasioned about dying and tinging of glass, and of the excellency of the flint-glass now made in England; as also about the hardness of precious stones, and the way of flitting them, some by the blow of a hammer, others by a wire dipped in vinegar and sprinkled with diamond powder, of which Dr. CROUNE undertook to bring in a more full account.

The third letter was from Mr. JOB LUDOLFUS to Mr. HOOKE, dated at Francfort 31 December, 1679, giving an account, that Dr. CLAUDER's invention of preserving dead bodies was in the press; and that himself would for the future gladly continue his correspondence, and communicate what he should meet with considerable with regard to geography.

April 22. Mr. HENSHAW vice-president in the chair.

He produced a Latin letter to the Society from Dr. WULFER dated at Nuremberg, April 1, 1680\*, in answer to one of Mr. HAAK to him, and giving a more full

\* Ibid. p. 108. An abstract of this letter is printed in Mr. HOOKE's *Philosoph. Collect.* No. 2. p. 10.

account concerning a body, which was there found to be converted into hair, as he had received it from the sexton himself, who had dug it up; viz. that it was the body of a woman buried about forty-three years before in a black wooden coffin in a dry yellowish earth: That it lay the lowest of three bodies: That the cover being removed, the shape of the whole body appeared perfect, but all covered with hair, long, thick and curled: That the sexton going to feel the head, the whole shape of the body fell to dust; so that nothing remained but a part of the heel-bone: And that the hair, which covered the whole body, was at first very soft, but being exposed to the air grew very hard. A paper of which hair was inclosed in the letter, and was found to be stiff, red and rotten.

Dr. CLENCH was admitted fellow.

Dr. TYSON produced three teeth set or growing in a natural socket, together with a paper of curious white hair, both which were upon dissection taken out of the ovary of a woman lately dead. This was the more remarkable, as it was much of the same kind with what he had formerly found himself upon the dissecting of another woman. He was desired to draw up an account thereof in writing\* against the next meeting, that it might be registered before he returned the substances themselves to the person, that communicated them, who was Dr. WELMAN.

A paper of Mr. HOUGHTON in answer to several queries about wire-drawing was read; and he was desired to inform himself yet more fully concerning that manufacture, and to bring in a farther account thereof.

He produced a blue bead much esteemed by those of Guinea; as also some glass beads, that had been made to counterfeit the colour: but they were in no respect so beautiful and clear of colour as those of Guinea. One of the latter was tried to be melted in the flame of a lamp, but without success; but it flamed and cracked like a stone. The counterfeit one melted very readily.

Mr. HOOKE conceived, that he could make glass beads as beautiful for colour, but could not imitate the hardness and fixedness of them. He was desired to make some trials about it.

Some of Dr. BEAL's letters to the secretary were read, and the rest referred to the next meeting.

Mr. HOOKE produced and shewed a new kind of level invented by himself, it being the most convenient and exact way of any, that hath yet been made use of. The instrument not being quite perfected, the description thereof is omitted till the next meeting.

\* This account is published in Mr. Hooke's Philosoph. Collect. No. 2. p. 11.

† In the letter-book, Vol. 6. p. 95 and 107, are three letters of Dr. BEAL to Mr. HOOKE, one dated February 18, 1685, about grapes thriving

in England; another dated March 13, on the same subject; and the other 31 March, 1680, concerning the improvement of land by rain, and about cherries and cider.

April 29, Mr. HENSHAW, vice-president, in the chair.

The minutes of the 22d instant were read.

After which Dr TYSON produced a draught of the three teeth set in a socket mentioned at the last meeting; as also of a stone taken out of the kidney of the same person. He promised to draw up a large account thereof in writing.

Dr WALLIS read part of a large discourse of his about the paschal tables, shewing the reason of many mistakes and diversities of opinions among authors about assigning the true time of Easter; and also shewing a way how the same is to be rectified.

Dr. JACOBUS PIGHIUS of Verona, physician to the emperor, and professor of anatomy at Padua, formerly proposed candidate by Dr. BROWN, was now at his desire put to the ballot, and elected fellow of the Society.

Captain Wood was admitted fellow.

A letter of WILLIAM BALLE, Esq; to Mr. HOOKE, dated at Mainhead in Devonshire, 24 April 1680 was read, giving an account of some magnetical observations, which he had already made, and of his intentions of making divers other instruments and trials; as particularly of making a magnetical needle of 10 feet in length, and another of 20 feet in length, in order to examine the variation of the directive virtue. Mention was likewise made in this letter of an observation of the variation near the Sound.

Hereupon Dr. WALLIS mentioned some opinions about the variation of the latitude of places. And Mr. HOOKE remarked, that Monf. PETER PETIT had written a discourse on that subject, endeavouring to make it probable. It was conceived, that the cause of this opinion might be imperfect observations made of the latitude of places by different authors; and that till there was more certainty of the accurateness of instruments and observations, nothing could be concluded about that controversy.

Dr. WALLIS said, that they had found the latitude of Oxford now not to be more than 51 deg. 46 min; whereas divers had made it near 10 minutes more.

Mr. SMITH<sup>a</sup> said, that Constantinople was now found to be 40 deg. 57 min.; whereas in many maps it was placed in 43 degrees.

A letter of Monf. JUSTEL to Mr. HOOKE, dated at Paris 10 April 1680<sup>b</sup>, giving an account of a German physician, who distilled the matter of a plague sore; of Monf. VILLETTE's making a burning glass of three feet seven inches diameter, the focus being 3½ feet distant; with some other articles of literary intelligence.

<sup>a</sup> THOMAS SMITH, afterwards D. D.

<sup>b</sup> Letter-Book, Vol. viii. p. 110.

Some discourse was occasioned about the variation of the magnetical needle, and the best form of dipping and variation needles.

Capt. WOOD said, that his needle was so ordered, as to set itself in the meridian, and so to find its own dipping; which was concluded to be the best way.

He affirmed, that the island of Iluas, which was almost all magnetical, did notwithstanding not at all cause any variation of the compass at sea very near it.

He remarked likewise, that he had found the variation of the needle at Flores and Coruo, which had formerly been nothing, to be now 9 degrees westward.

Mr. HOOKE produced his new level, and explained it; and shewed wherein he conceived it to be superior to any kind of level yet made for plainness, certainty, and exactness.

May 8, Mr. HENSHAW, vice-president, in the chair.

Dr. WALLIS read the remainder of his discourse about the account of time, and the method of the patchal tables.

A present was made the Society, from Mr. JOHN SHORTER senior of London, of the following particulars:

CHEMNITIUS's *Examen Concilii Tridentini*, in fol.

A book for ordering all the officers of the king's chambers; the order of the king's going to chapel, and ordering of affairs on festival days, and the college of Windfor for St. George's feasts; the creation of a prince of the banquet at Greenwich on St. Thomas's day; and the order of sitting at the tables, with many other orders and things belonging to the management of affairs at court: a manuscript in folio.

Another manuscript in folio, being the manner of placing all estates and degrees according to their degrees at funerals or elsewhere; of all the officers at court, and their standing fees: the names of all the towns of war, castles, and bulwarks in all the counties of England and Wales, and the fees due to the commanders of them: the names of the ships of war, and a general muster throughout the whole realm of England and Wales: the number of churches in every shire; with other curiosities.

A *Prælice of Piety* in the Polish language, in octavo.

A Siam drum.

A prickly fish like a hedgehog.

A Pintado bird.

A Tropic bird, with one long feather in the tail.

May 13, before the Society sat, Mr. MELLIN, who had long made it his pleasure and business to make small lens's for microscopes, shewed several members of the Society some of his own making, which were extremely small, and yet very good; one whereof being a double convex, was no bigger than about

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a twentieth part of an inch. It magnified the object exceedingly, and yet was very clear. He promised to present a set of such lens's at the next meeting.

After this Mr. HOOKE giving an account, that he had seen several small animals in the water, wherein mint grew, the water was examined with a microscope, and several of those small long creatures were discovered by the vice-president and divers of the members.

The vice-president, Mr. HENSHAW, then took the chair.

The minutes of the meeting of May 6th were read.

The vice-president moved, that some of the small microscopes might be sent to Signor MALPIGHI as a present from the Society; which was well approved of by the Society.

Mr. HOOKE produced three letters from Mr. LÆWENHÖECK; one to the president and fellows of the Society, containing his thanks for the honour, which they had done him in choosing him a member. A second to Mr. HOOKE, acknowledging the receipt of the diploma sent, and a profession of the great esteem, which he had of the honour done him, and of his zeal to serve the Society in what he was able, for the future as long as he lived. A third to Dr. GALE, containing an answer to the doctor's address by the last letter, and an account of some farther discoveries made in the juice of plants, animals, &c. Mr. AUSTIN took this letter, and promised to translate it into English against the next meeting, it being written in Dutch.

Mr. HOOKE produced three papers delivered to him by Sir THEODORE DE VAUX, being some of Sir THEODORE MAYERNE'S, containing some account of the mixture of metals. They were ordered to be transcribed, and the papers to be returned to Sir THEODORE.

Mr. HOOKE produced the two first sheets of a discourse of Mr. JOH. LUDOLFUS, counsellor to the emperor and the duke of Saxe-Gotha, being the beginning of a history of Ethiopia and the kingdom of the Habeshines: which sheets were read, and ordered to be kept in the library.

Mr. PERKINS presented a paper, containing three queries about the mixture of metals.

The first was, what way to toughen a piece of gold not malleable, called *eager*, and to make it malleable without aqua fortis.

Mr. HENSHAW conceived, that the best way would be to anneal it by degrees, since metals and glass being suddenly quenched, or cooled, will become brittle.

Mr. HOOKE said, that there was a way of making some mixtures of metals  
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(as the factitious gold made with spelter, which is of itself very brittle) very tough and malleable, by cementing it with a vegetable powder. And that there was a way of hardening an amalgama of mercury and iron by a vegetable powder, which would make it almost as hard as hardened steel. This, he conceived, would be an excellent material for making specular planes for telescopes in Mr. NEWTON's way; since the form of such plates would be easily given by laying the said amalgama, when soft, upon the convex side of an object glass for a telescope made very large. The composition and manner of making and hardening that amalgama was much desired.

Mr. HOOKE mentioned, that he had been lately informed of a way to harden and fix mercury; but that he had not yet tried it, to see, whether it would succeed.

May 20, the Society did not sit.

May 27, Mr. HENSHAW, vice-president, in the chair.

The minutes of the 13th instant were read.

There was presented a new book of Mr. BOYLE, sent by himself to the Society, intitled, *Experimentorum novorum physico-mechanicorum continuatio secunda: in qua experimenta varia tum in aere compresso tum in subtilis instituta circa ignea, animalia, &c. una cum descriptione machinarum, continentur.*

It was desired, that some member would peruse this book, and give an account thereof to the Society.

Mr. HUNT was ordered to desire Dr. PAPIN to bring his glass, which he made use of for including bones, harts horns, ivory, &c. to be softened, and to shew it at the next meeting.

Dr. TYSON presented his printed discourse, containing the description of the parts of a porpoise dissected by him in Gresham-College, together with a discourse of the usefulness of such kind of anatomical inquiries. He received the thanks of the Society for this present, and was desired to procure his designed method.

Upon this occasion the design of getting the bodies of all such exotic animals, as should chance to die in St. James's Park, in order to their being anatomised and described, was again mentioned; and Mr. HENSHAW and Sir CHRISTOPHER WREN were desired to use their interest with the keeper of them to procure them for the Society's use.

Hereupon several things were mentioned relating to anatomy.

Mr. HOOKE produced a letter to himself from ECCARDUS LEICHTNERUS, dated  
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at Erlort 8 May 1680<sup>1</sup>, mentioning somewhat of a design, which he had, of sending over some writings of his, to be left with the Society. But upon discouraging of the matter, and no person present being able to give a character of this author or of his writings, they demurred upon giving their positive answer till by a farther information they could learn, whether they might deserve to be printed; or at least, whether it were convenient for the Society to be any ways concerned for the publishing or not publishing of them.

Dr. TYSON gave an account of the trials, which he had made in order to examine the serpentine-stone of Mr. HOUBLON, which was, that he, together with Dr. BROWN and one other person, had tried the biting of a viper on two dogs; but finding, that neither of them died, or grew very sensible of the viper's biting, they did not think fit to make any farther trial with it.

Mr. HOOKE mentioned, that he had found the place in Monsr. TAVERNIER's voyage, where he speaks of this kind of snake-stone; and said, that he had there described the snake by a picture; and that the way of using it was by rubbing it against another stone; by which means a kind of oil was produced, which was made use of for the antidote against poisons.

Dr. TYSON remarked, that Signor REDI doubted of the effects of the flat serpentine-stone, supposing it to be factitious.

Mr. ASTON affirmed, that it was a factitious stone.

Dr. TYSON gave an account of his trial of a serpentine-stone, by applying it to the hand of a servant bit by a viper. He also affirmed, that this stone being applied to an hydropical leg was found to stick to it; and that he had known and used it in an erysipelas after a fever.

Mr. HUNT brought in a draught, which he had made of this stone; which was ordered to be inserted in the Register<sup>a</sup>, with a description of the stone, when it should be brought in.

It was ordered, that some trials should be made with the stone, to see, whether it answers in all things Monsr. TAVERNIER's description.

Mr. HOOKE shewed an experiment, found out by his highness prince RUPERT; which was, that a quantity of rectified spirit of wine being put into an æolipile, and by the heat of a chafing-dish of coals converted into vapours, which issued out of the small hole of the æolipile in a stream with great violence, would by the flame of a candle held under that stream be all fired and turned into a great and hot flame, which readily melted lead, glass, &c. and so might be of very good use for blowing the flame of a lamp for working glasses, as his highness had at first designed it.

<sup>1</sup> Letter-Book, Vol. viii. p. 111.

<sup>a</sup> from the end of Vol. v. 2: March 1680, to

<sup>b</sup> There is no entry of papers in the Registers the beginning of Vol. vi. 12 December 1681.

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Mr. HOOKE alledged, that he had made use of this way for driving out the air of small round glasses, in order to make several experiments with them; of which an account was extant in the Register for the year 1662; and that, if the Society pleased, they might see the experiment of it upon this æolipile: but it being late, this was referred to some other meeting.

June 3, Sir CHRISTOPHER WREN, vice-president, in the chair.

The minutes of the last meeting were read, which gave occasion to discourse,

1. Of the new experiments of Mr. BOYLE, mentioned in his *Experimentorum novorum physico-mathematicorum continuatio*, of which book Mr. HOOKE gave some account: as also of Dr. PAPIN's engine for boiling. Mr. HUNT mentioned, that he had spoken to Dr. PAPIN about it; but that he was now making some alterations in it, and therefore could not yet shew it to the Society. It was moved, that some of the experiments might be shewn at the meeting; but it was answered, that they required much time for making them: and that as to the effects of the engines for rarefaction and condensation, they had been already seen by the Society.

2. Of Dr. TYSON's book on the porpoise; upon which occasion it was mentioned, that he had several other curious anatomical observations by him; which he was therefore moved to publish.

3. Concerning the serpentine or snake-stone, shewn to the Society, of which Dr. CROUNE gave an account, that steeping it in water he had found it very brittle, and therefore judged it to be the same with the porcupine-stone, which is much of that shape and taste: of which that the Society might be sensible witnesses, it was steeped in a little water, and then the stone being touched by the tongue, it tasted extremely bitter; but the water, in which it was steeped, was very little so. It was likewise rubbed upon a porphyry stone, whereby it left a kind of paste or pap, which tasted very bitter. This being mixed with the water, in which it was steeped, was ordered to be given to the dogs, that were soon after to be poisoned, the one with a pill of *nux vomica*, and the other with a quantity of oil of tobacco.

Hereupon discoursing about the poison of rattle-snakes, it was inquired, whether the Society had not had one alive to make experiments with, and what the effects were.

Mr. HENSHAW produced and read a proposal, which he had received from Sir PETER WYCHE, presented to him at Hamburgh, about a new way for the quenching of any fire very easily and suddenly. The proposal itself was this: "Nova et artificiosa inventio, quâ omnia in civitatibus et propugnaculis oriunda incendia eo momento, quo innotuerint, citissime extingui queant, mediante commodissimo quodam instrumento, quod hæcenus nullibi in usu visum et repertum, et quod tempore gliscentis flammæ ubique copiam sui et applicati-  
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"onem facile admittit; paucis omnino sumptibus absque ullo tumultu per plateas, et destructione vicinarum ædium, tempore obsidionis, incendiorum, aliorumque infelicitum casuum; ære omni dignius." Together with another paper, wherein the author addressed himself to the Society for a reward upon his discovery of it.

Mr. AUBREY produced a letter from Mr. PASCHAL, giving an account of a monstrous birth, at Hilbrewers in the county of Somerset, of two children perfectly joined together into one body about the navel, but separated into two distinct bodies both above and below the belly<sup>1</sup>. They eat, sucked, cried, slept, and voided their excrements each apart, and very freely, and were likely to live.

Sir CHRISTOPHER WREN was of opinion, that most monstrous births proceeded from twins.

Mr. HENSHAW related of the Italian monster, that had been formerly in England, and had his brother growing out of his side about the navel, that his brother had the small-pox, and yet he escaped them; that his brother a good while after died first, and then he himself died quickly after.

Dr. CROUNE mentioned, that Dr. KERCKINGIUS had related, that a woman, upon seeing a child fall and beat out its brains, had brought forth a child with a head exceedingly bruised.

Hereupon much discourse was occasioned about monstrous productions of several kinds, as those by conceits and frights; and from the mixtures of different species, as of mules by that of the horse and ass. Sir CHRISTOPHER WREN and Mr. AUBREY mentioned a production, which they had seen, from a male cat and female rabbit. Others spoke of mixtures of partridges and pheasants with some poultry; and of ducks with sea-fowl: many of which species, though they were really different, yet varied so little from one another, that they often engendered one upon another: but that it was generally observed, that all these mixt productions were barren, and would not go on to propagate their like.

Hereupon several members mentioned the great variety, that is to be found in creatures of the same species, as of dogs, goats, sheep, poultry, &c. amongst which Sir CHRISTOPHER WREN described a pheasant of Surinam, and Dr. GALE the partridges of Portugal.

The experiment with the two dogs was tried, by giving to one a quantity of *mux vomica* in butter, and to the other a quantity of the grand duke's oil of tobacco, in order to try the serpentine-stone and water upon them: but these poisons not working during the sitting of the Society, Mr. HUNT was ordered to take care of them, and when sick to give them the preparation above-mentioned.

<sup>1</sup> This account is printed in Mr. Hook's Philof. Collect. No. 2. p. 21.

June 10, the president in the chair.

The minutes of June the 3d were read, and several parts thereof discoursed upon.

Mr. HOOKE produced a letter to himself from Mr. PULLEYN, dated at Rome 25 May 1680<sup>a</sup>, giving an account of the death of Signor BORELLI, and that his work *De motu animalium* was half printed: that the fathers of the *Schola pie*, who were his executors, were printing the second part of it; which would be published in September following: that Signor VIVIANI's piece *De locis solidis* was not yet published: that Signor BOCCONE designed to send 300 plants discovered by him, and by none else, to the Society; and that his natural history of Corsica was ready for the press: that Signor SCILLA had published at Naples a tract concerning shells and petrified bodies: that Signor VITALE GIORDANO had published an edition of EUCLID in folio, being the first of seven volumes of his *Corpus mathematicus* then printing: that a Dutch engineer at Rome, named LE MAIRE, had recovered much ground out of the Tiber, and thereby discovered a pyramid somewhat like that of CESTIUS, concerning which he had published a treatise, and was about cutting a passage to Perugia: that Signor FABRETTI was publishing a discourse concerning old Roman aqueducts: that Signor BELLORI and Signor Pozzo had finished a description, with a great number of copper-plates, of the monuments of the family of the NASONES, &c.

With this letter came inclosed some part of BORELLI's book, *viz.* his Proem, and a sheet of the book, with two cuts; which were all read and perused.

Mr. HOOKE read likewise a letter to himself from Signor NAZZARI, dated at Rome 20 March 1680.

He produced two letters from Mr. LEEWENHOECK, which not being yet translated into English, were referred to the next meeting.

Mr. HOOKE gave an account of the experiments tried with the æolipile; as also of what he, together with Dr. TYSON, had observed of \*\*\* at the lord mayor's on the Monday before, while it was yet alive, and while it was cut to pieces by the cook. It was hereupon desired, that some care might be taken to procure some other hereafter, either from the lord mayor, to whom any strange fishes caught in the Thames are generally brought, or by some other means, that so they might be dissected and described more particularly than they had hitherto been.

Mr. HOOKE was desired to bring in his account of the trials about metals at the next meeting, and to think of some other subject to be prosecuted for the future.

June 17. Upon occasion Dr. CROUNE delivered to the Society a discourse upon

<sup>a</sup> Letter-Book, Vol. viii. p. 116.

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the structure of a muscle \*, read by him before the Society in 1674, and grounded on a lecture of his read in chirurgeons hall.

A letter from Mr. LEEWENHOECK was read.

Dr. GALE was desired to write to Mr. PULLEYN at Rome.

June 24, Dr. PAMAN shewed a stone of great bulk taken out of an horse's bladder, concreted of many stones, weighing four pounds and a quarter, one side rugged, the other smooth like pebbles. He was desired to take a particular account of the horse, stone, &c.

Mr. HILL presented from Mr. LANGERMAN, a merchant, a spar, or mixture of stone, spar and pyrites, such as is usually found in lead-mines.

Mr. CHETWYND presented a piece of lead-ore taken out of a mine in Staffordshire, in form octoedral, in which form all the ore in that mine arises.

Mr. AUBREY presented a large fly, the product of a scolopendra; the tongue of it coiled up in the mouth. It darteth it out, and from the end of it droppeth a poison.

The president gave the Society Lord BACON's *Sylva Sylvarum*.

July 1. It was ordered, that an experiment be made, whether salt-water will rise higher than fresh.

A letter from Mr. LIMVILLE concerning a method of softening flints was read.

Dr. PAPIN shewed a glass, which with a cement was made whole and strong, after it was broken: which cement might be useful in porcelain, &c.

Sir CHRISTOPHER WREN affirmed, that extreme freezing will sweeten salt water: that the curd, which is then upon the surface of the water, will be found sweet: that this is found in Hudson's Bay: and that a little hole left in a window in winter, and a little fire in the chimney, will freeze any thing to a great degree.

He was of opinion, that in trees gum is the disease of them.

Mr. ASTON read an account of the stone sent by the East-India company to the Society; that it is called *Piedra de Cobra de Mombaza*, as being found at Mombaza, in the province of Zanguebar in Africa, in the head or belly of a serpent: that its virtues are the helping of women in childbed, curing the colic, melancholy, or fevers, if given in the fits: that the way of using it is to rub it

\* It is printed in Mr. HOOKS'S *Philos. Collect.* N<sup>o</sup> 2. p. 22.

on a hard smooth stone, till a cream comes out of it, which is generally dissolved in water, and administered to the patient as a counter-poison: that they are very rare in Europe, and that in the East-Indies one of this sort hath been esteemed worth an hundred pieces of eight: that it was tried very accurately by FRANCESCO REDI, a virtuoso of FERDINAND grand duke of Tuscany (who had one of these stones presented to him) but with no success: that it was given to dogs poisoned with vipers and *nux vomica*, but that the dog poisoned with *nux vomica* died very suddenly, notwithstanding this remedy; but that the vipers were not fit for poisoning.

July 8, Mr. HENSHAW, vice-president, in the chair.

Upon discoursing about the small microscope glasses lately made by Mr. MELLIN, Mr. HENSHAW related, that he had newly observed a sort of small animals generated in the water, in which sliced ginger had been steeped, being much the same with those of pepper-water of the larger size; in which he could plainly perceive a distinction of the inner parts of their bodies, which he observed to be much the same in divers of them: and he was of opinion, that these and several other small animals were spontaneously generated without any previous seminal principles.

Mr. HOOKE related, that upon long keeping of pepper-water, and renewing the water several times, as it had evaporated and dried away, he had observed a sort of exceedingly small animals swimming in it, which were perfectly shaped like fishes, such as minnows, or the like, in which he could plainly see the head and belly or bowels more opaque, and the tail or smallest part transparent.

Upon a discourse of the poisonous nature of some trees, and particularly of the yew-tree for horses. &c. Mr. HOUGHTON affirmed, that he had notwithstanding divers times eat the berries of it without harm.

Mr. HENSHAW related, that there was a Frenchman in England, who contradicted the observations of Monf. TAVERNIER in many particulars.

Mr. HOOKE gave an account of a letter to himself from Monf. JUSTEL, dated at Paris 13 June 1680 N. S., containing these remarkable particulars:

1. That there was at Paris a man, who pretended to have phosphorus in much greater perfection, than any yet known, which being put into a glass well stopp'd, inflightened a whole room; and that a friend of Monf. JUSTEL, who saw it, said, that it exceeded that of KUNKEL.

2. Of a treatise of one, who had been long of the mint of Paris, about the essaying of metals; and that he had likewise a pair of scales, that would turn with the 2500th part of a grain.

3. Of the discovery of an earth and mineral near Dresden, of a red colour, which smelt of violets, and was found to have considerable effects in physic.

4. That Mr. BALDWIN of Dresden, who formerly corresponded with Mr. OLDENBURG, was desirous still to do so with the Society, and to communicate his secrets : that he had a new way of printing with an instrument, that cost very little, only fifteen livres.

5. That Monsr. CHARDIN was returned from India, and had brought with him a book written in the Malabar language, and supposed from the curious writing and pictures to be the Bible, but that the language was not understood : it was written on the bark of trees and the leaves of the palm.

6. That the king of Poland being desirous to have an account of the road, by which the Russians travel by land to China, had sent to his ambassador at Moscow, to inform himself thereof, who had sent the king an intelligent person, that had been several times that journey, and gave him a pertinent description of the manners, speech, wars, and habitations of the people on that road : that the king had called together at Warsaw the Tartars, Calmucs, and Greeks, who had been in Tartary, to understand what they knew of those parts, and propounded several queries to them.

7. That a person had written from Poland, that he was informed, that in the farthest part of Tartary there was a people, who spoke Hebrew.

8. Monsr. JUSTEL inquired, whether the two spots in the sun lately observed at Paris had been seen at London.

Several parts of this letter were discoursed upon ; and it was desired, that it should be answered ; and that the correspondence should be renewed with Mr. BALDWIN : and inquiry being made, whether the spots in the sun mentioned in the letter had been seen here, it was answered in the negative.

Mr. ASTON related, that Mr. MELLIN had made a double convex microscope glass, which having weighed at the Tower, he found so weigh less than the 80th part of a grain ; and that he had since perfected another not a 5th part of that bigness.

Several experiments were tried about the rising of liquors in small pipes. The experiments were made by dipping in a small glass pipe to a certain depth into fair water, put into a small glass, jar, or dish, and then marking the weight of the water both within and without the pipe ; then taking it out with the marks upon it, and blowing out all the water in its cavity. It was sunk into brine of water and salt, to see how high that would rise ; and with the same care, the brine being blown out, it was sunk into spirit of wine ; and again, upon cleansing, into aqua fortis. Every one of these experiments were several times repeated ; but upon many trials it was found, that the heights of these risings were very uncertain,

uncertain, and varied every time they were tried, and this so irregularly, that it was not easy to assign the cause thereof. For sometimes the water rose highest, sometimes the brine; sometimes the aqua fortis. But the circumstances, that caused that variety, were not discovered. However, it was desired, that some farther experiments should be made at the next meeting about this matter, and trials made in the exhausting engine, to see what height it would rise therein, and whether water would run in a syphon.

After this was much discourse about the cause of this effect, whether from pressure, inward motion of the water upon the pipe's touching it, or the like.

Mr. HOOKE explained his thoughts of it, and endeavoured to shew the reason thereof from the congruity of the fluid bodies with the solid: but it was desired, that some farther experiments should clear it.

After this discourse was ended, Mr. HENSHAW read the second section of *Century I.* of Lord BACON's *Natural History*, which related to the internal motion of bodies, intitled, *Of motion of bodies upon pressure*: whereupon the first experiment was debated. Mr. HOOKE related, that he had observed, that the motion of the glass was vibrative perpendicular to the surface of the glass, and that the circular figure changed into an oval one way, and the reciprocation presently changed it into an oval the other way; which he discovered by the motion of undulation or rising of the water in the glass, which he discerned to be in four places of the surface in a square posture. It was moved, that the experiment should now be tried before the Society, which was accordingly done; but that figure was not so plain, but that some doubted it. But Sir CHRISTOPHER WREN coming in said, that the glass would vibrate much stronger, being struck on the edge with a viol-bow. This was also tried, and then the square undulation was extremely plain. But there was likewise discovered another undulation, by which the water was observed to rise in six places like an hexagon; and upon farther trials, also in eight places like an octagon. Each of these gave their particular and distinct sounds; the 4 and 8 were octaves, and the 6 and 4 were fifths. The farther examination of this was left to the next meeting.

July 15, Mr. HENSHAW, vice-president, in the chair.

The minutes of July the 8th were read.

Upon the first paragraph thereof Mr. HENSHAW gave a further description of the parts of those small animals, which he had observed in ginger-water; and supposed those parts, which Mr. COCKS affirmed were protuberant and swelling, to be rather hollow and concave; and mentioned the observation, which had been formerly taken notice of in viewing a guinea through a microscope, that swelling figures often appear hollow, and hollow ones swelling.

He desired, that Mr. MELLIN should be spoken to, to fit one of his glasses like those, which Mr. COCKS made, with a plain glass before it, as being more ready than that, which himself made use of.

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The account of the experiment of sound in a glass with water was read; and it was desired, that the experiment should be tried at the next meeting before the Society with some other glasses, to see what farther discoveries might be made by it.

Mr. HOOKE's letter to Mons. LEIBNITZ concerning the farther usefulness of the philosophical language and character was read.

Dr. ST. JOHN's letter was read.

Then the experiments to be made in the exhausting engine were tried; but the engine was found to be imperfect, and so nothing could be concluded certainly from them; the engine upon being removed into the place, where the Society met, having proved leaky, so as that the receiver could not be well exhausted. It was ordered, that Mr. HUNT should put all things into better order against the next meeting.

July 22, Sir CHRISTOPHER WREN, vice-president, in the chair.

The minutes of the last meeting were read; whereupon Mr. HENSHAW gave an account, that he had observed an infinite quantity of other yet smaller animals in ginger-water; and that he conceived, that it was much more prolific than pepper-water, and had besides a greater number of very large animals, which appeared so large, that he conceived their legs, fins, or parts for motion would be seen, if they had any; and therefore he supposed, that they had none.

Sir CHRISTOPHER WREN was of opinion, that the reason, why those parts were not visible, was the swiftness of the motion of the animals.

It was desired, that these small animals might be examined with the best microscopes, that could be made, to see, if any farther discovery could be made of their way of moving.

Dr. CROUNE acquainted the Society, that Mr. MELLIN had promised to fit up one of his best microscopes for that purpose.

Dr. KING related, that he had observed the motion of these animals among the globules of blood, by mixing a little blood with pepper-water.

Sir ROBERT REDDING affirmed, that he had seen multitudes of them in water, in which others had been steeped.

Dr. GALE read part of a letter from Dr. BOHN, and brought in seven little tracts on philosophical subjects sent by him to the Society, which were as follow:

1. *Dissertationum chymico-physicarum, prima de corporum dissolutione per D. J. BOHN & M. J. W. PAUL. Lips.*

2. *Secunda de corporum continuatione seu concretione per D. J. BOHN & ERNEST. GOTTFREID. Heyſe Dantiſcanum.*

3. JAC. JOH. WENCESLAI DOBRZENSKY *de miſc. pente præſervativum univerſale naturale.* Præge 1680.

4. *De contagione Dicensi experimentum medicum Doſtoris JOH. BAPT. ALPRUNI.* Præge 1680, 4to. half a ſheet.

5. *Idem*, 8vo. *ibid.* half a ſheet.

6. G. BALDWINI *Epistoſa ad Dem. JOH. HEVELIUM de machina celeſti &c.* Ratiſbon 1679.

7. *Subjeſti maſculini anatomica publica leſturis denunciati D. J. BOHN.* Lipſiz 1680.

Dr. GALE was deſired to return the Society's thanks to Dr. BOHN for this preſent, and to ſend him Mr. BOYLE's late book, together with that of Dr. TYSON, both in quires.

Dr. CROUNE gave an account of Mr. WARREN's method of preſerving bodies by a powder; and was deſired to bring Mr. WARREN to the Society, and to prevail with him to ſhew them the experiment: which Dr. CROUNE promiſed to endeavour to do. It was ſuppoſed, that the chief ingredient of that powder was ſomewhat of vitriol.

Sir CHRISTOPHER WREN, with the approbation of the Society, ſigned a bill for the table and inſcription ſet up in the long gallery.

The following experiments were tried:

1. Of the extraordinary ſtrong ſound of a glaſs funnel ſtruck with a viol-bow, which yielded four or five ſeveral and very diſtinct ſounds, viz. the loweſt ſound a fifth, a fourth, and an eighth, and twelve higher.

2. Another large glaſs holding about three quarts, almoſt filled with water, was ſtruck on the edge with a viol-bow, and it was very viſible, that, according to the ſound, was the number of the places in the glaſs, where the water played. The places were either 4, 6, 8, 10, 12; and ſome were confounded and broad, which ſeemed to participate of two ſounds.

3. Several experiments were tried with ſmall glaſs-canes in the exhausted receiver, to ſee, whether the water would riſe in them: but upon trial there could be nothing certainly concluded from them, ſome of them being ſtopped by the melting of the cement on the top of them.

But a ſyphon being tried, it was found, that the water would run through the ſame out of one veſſel into another, as well when the air was exhausted as before.

Dr. PAPIN made a trial of ſmall pipes cloſed at the top in his exhausted receiver, affirming, that it would aſcend into ſuch a pipe as well, as if it were an open

open small pipe in common air. But it could not be perceived, that the water ascended into it till some air being let into the receiver, the water went to the top of the sealed pipe : and by the exhausting it afterwards, it was made to descend again upon the top of the pipe.

July 29, Mr. HENSHAW, vice-president, in the chair.

The minutes of the 22d instant were read ; whereupon the subject of filtration and rising of liquors in small pipes was debated, and an account was given of the experiments made at the last meeting, and wherein the difficulty of them appeared ; viz. first, from the imperfect exhaulsion ; and secondly, from the uncertainty of the rising of the same liquor in the same pipes at several times.

Hereupon Mr. HENSHAW moved, that there might be two experiments farther tried, viz. first, whether a liquor will rise in vacuo in these small pipes ; and secondly, whether it would filtrate either through a cloth or a small syphon ; for that he conceived, if it were found to do either, or both of these, it could not be said to receive its motion from the different pressure of the air.

Dr. KING related, that he had observed six or seven sorts of animals, a thousand of any of which were less than a globule of blood.

Mr. WARREN's way of preserving dead bodies being farther discoursed of, Mr. HENSHAW conceived, that spices were the best ingredients of a powder for doing it, as of pepper, cloves, mace, &c. adding, that he was sure, that the child presented to the king by Dr. WARNER many years before was preserved in a pickle, and not in spirit of wine : that the glass was stopped with wax, and that no wax-stopple would contain vinous spirits.

Most of the members of the Society being either gone, or going into the country, the Society adjourned their usual meetings till further summons should be sent by the president or vice-president.

November 4, the Society upon notice sent to them met again at Gresham-College, after their recess during the autumn : but neither the president nor vice-presidents being present, Sir ROBERT REDDING was desired to take the chair.

Dr. CROUNE produced a letter to himself from Col. WILLIAM SHARP, dated at Barbados 16 Aug. 1680, together with an account of his observations of the weather, and of the mercurial barometer sent over thither by the Society, and his conjectures about the cause of the motions of that instrument. The Letter and account were as follow :

“ I received your letter in April last, together with the barometer, and having with all exactness fitted it, according to your direction, I pursued the account  
“ you desired, a copy of which in the enclosed sheet I send you ; and what you

Letter-Book, Vol. viii. p. 127.

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II

“ find

" find of method and order wanting therein, my own ignorance, and not having the conversation of any one man of experience here, will, I hope, move you to excuse me.

" I am sufficiently convinced of the exactness of that instrument to the purposes designed it; and being now grown into some acquaintance with it, am seldom disappointed in my expectations, and wish I could as well vindicate my reason, which seems to oppose even the necessary consequences of it, as that the weight of the air should compel the mercury to descend; for if the weight of the air hath any effect, as doubtless it hath, it then seems to me, that the stagnant mercury in the receiver, at the bottom of the barometer, is the most proper and liable object to receive it; and that being imposed on by such weight must needs press the parts downwards, and consequently compel the mercury to rise in the barometer; and by the same consequence, when the air is highest, the mercury freed from suppression ought to yield itself, and rise in the receiver, and grow low in the barometer. But that proving contrary to all experience, I am willing to quit those reasons, and to accommodate myself to such other, as may be better justified by the effect, unless I could be allowed to fix upon another notion, from which only the common absurdity, that is granted in it, prevents me, which is, that the air, which we apprehend the heaviest, may perchance be the lightest, and being extenuated by exhalations, may weigh less than a clear one; and if so, there would remain no wonder, that the mercury did subside at the approach of it, for the reasons aforesaid. But still having a desire to enquire after some more probable, I would, in order thereunto, consider the other end of the glass, and ask, if the air, or that included vacuum there (I know not what to call it) may not have some affinity to the atmosphere, and being sensible by some sort of sympathy of what happens there, when that is slackened and loaded with exhalations, that vacuum may not also slacken and relax, and losing its volatile and ascending quality, suspend itself on the mercury to the suppression of it; and on the contrary, when the atmosphere is discharged, that springy nature in that vacuum may not reassume itself, and by its rising, admit the same to the mercury.

" Thus far, Sir, you have my weak conjectures; and it will be less confidence to acquaint you with the few observations this little time hath furnished me with; and because the notice of a storm's continuance may be as beneficial as that of its approach, I was solicitous to find out some marks, that might direct to it; and having observed, upon an unusual and remarkable depression of the mercury (not the little dippings, which commonly the latter end of a fair day does usually produce), the exact time of that depression, the continuance of the mercury's descending, even to the time of its apparent ascending, which happens some hours before the storm, I have thereupon hitherto found, that the continuance of the violence of the storm, that happens after, is full as long, as the time from the descending to the ascending of the mercury. Sir, you may also perceive, by the account I have sent, that the motions of the mercury are very minute here; which I attribute to the constancy and certainty of the wind in this climate, where nature hath for the most part limited it within few points.

" and

" and also to the small, narrow, and broken clouds that fall here, of whose weight  
 " the air can be but little sensible. And I have delayed the account the longer,  
 " that it might enter into that season, whereunto the tempestuous weather (if  
 " any in the whole year happen) is generally confined. And now, Sir, I can-  
 " not but conclude, that you may well wonder to see a man, so totally ignorant  
 " in speculations of this nature, so forward to declare it also: but it is not through  
 " want of my taking true measures of my own insufficiency, but out of an unruly  
 " desire to appear, even in the meanest circumstance, serviceable to you; upon  
 " which score I hope you will not only conceal, but pardon, &c.

" I have inserted in my Calendar some other hours than you appointed, but  
 " have not admitted that; and in some places have divided a  $\frac{1}{15}$  into four  
 " parts, because I found less than  $\frac{1}{15}$  denoted a considerable alteration. *Barbados*,  
 " 16 Aug<sup>y</sup>, 1680."

	Hour.	Degrees.	Wind.	Weather in Barbados.
April	8	9	29 $\frac{1}{15}$ E. N. E.	fair and little wind.
	9	9	29 $\frac{1}{15}$ $\frac{1}{2}$	some showers, the like wind.
	10	9	29 $\frac{1}{15}$ E. b. N. E.	continues in the same manner.
	11	9	29 $\frac{1}{15}$ E. N. E.	the same.
	12	9	29 $\frac{1}{15}$	the same.
	13	9	29 $\frac{1}{15}$	the same.
	14	9	29 $\frac{1}{15}$ E. b. N.	the same.
	15	9	29 $\frac{1}{15}$ E.	the same, almost calm.
	16	9	29 $\frac{1}{15}$	fair.
	17	9	29 $\frac{1}{15}$ E. b. S.	fair, little wind.
	18	9	29 $\frac{1}{15}$	fair, more wind.
	19	9	29 $\frac{1}{15}$	the same.
	20	9	29 $\frac{1}{15}$ E.	some showers.
	21	9	29 $\frac{1}{15}$	frequent showers, strong wind.
	22	9	29 $\frac{1}{15}$	rain, and some gusts.
	23	9	29 $\frac{1}{15}$ E. S. E.	showers and small winds.
		4	29 $\frac{1}{15}$	close weather.
	24	9	29 $\frac{1}{15}$	much rain.
	25	9	29 $\frac{1}{15}$	clear and gentle wind.
	26	9	29 $\frac{1}{15}$	the same.
	27	9	29 $\frac{1}{15}$	the same.
		4	29 $\frac{1}{15}$ $\frac{1}{2}$ E.	very hot and soft wind.
	28	9	29 $\frac{1}{15}$	
		4	29 $\frac{1}{15}$	thunder, lightning, much rain.
	29	9	29 $\frac{1}{15}$	fairer.
	30	9	29 $\frac{1}{15}$	some showers, little wind.
May	1	9	29 $\frac{1}{15}$ E.	fair gentle wind.
	2	9	29 $\frac{1}{15}$	showers the same.
	3	9	29 $\frac{1}{15}$	changable.
	4	9	29 $\frac{1}{15}$	the same.

H 2

May

## THE HISTORY OF THE [1680.

	Hour.	Degrees.	Wind.	Weather in Barbados.
May	5	9	29 $\frac{1}{8}$	E. fair weather, soft wind.
	6	9	29 $\frac{1}{8}$	E. b. S. the same.
	7	9	29 $\frac{1}{8}$	the same.
	8	9	29 $\frac{1}{8}$	fair, and soft wind.
	4	29 $\frac{1}{8}$		the same.
	9	9	29 $\frac{1}{8}$ $\frac{1}{2}$	
	4	29 $\frac{1}{8}$		rain, thunder, little wind.
	10	9	29 $\frac{1}{8}$	much rain.
	11	9	29 $\frac{1}{8}$ $\frac{1}{2}$	E. grows fair.
	12	9	29 $\frac{1}{8}$	changable.
	4	29 $\frac{1}{8}$ $\frac{1}{2}$		
	13	9	29 $\frac{1}{8}$	showers and strong wind.
	4	29 $\frac{1}{8}$ $\frac{1}{2}$		fair and windy.
	14	9	29 $\frac{1}{8}$	the same.
	15	9	29 $\frac{1}{8}$	the same.
	16	9	29 $\frac{1}{8}$	E. b. N. the same.
	17	9	29 $\frac{1}{8}$	the same.
	18	9	29 $\frac{1}{8}$	the same.
	19	9	29 $\frac{1}{8}$	the same.
	20	9	29 $\frac{1}{8}$	the same.
	21	9	29 $\frac{1}{8}$	the same.
	22	9	29 $\frac{1}{8}$	E. showers, and windy.
	23	9	29 $\frac{1}{8}$	showers and strong wind.
	24	9	29 $\frac{1}{8}$	the same.
	25	9	29 $\frac{1}{8}$	the same.
	26	9	29 $\frac{1}{8}$ $\frac{1}{2}$	E. b. N. dry and strong wind.
	27	9	29 $\frac{1}{8}$ $\frac{1}{2}$	the same.
	28	9	29 $\frac{1}{8}$	the same.
	29	9	29 $\frac{1}{8}$	the same.
	30	9	29 $\frac{1}{8}$	the same.
	31	9	29 $\frac{1}{8}$	the same.
	4	29 $\frac{1}{8}$ $\frac{1}{2}$		the same.
June	1	9	29 $\frac{1}{8}$	E. b. N. great showers, less wind.
	4	29 $\frac{1}{8}$ $\frac{1}{2}$		showers, more wind.
	2	9	29 $\frac{1}{8}$	the same.
	3	9	29 $\frac{1}{8}$	fair and windy.
	4	9	29 $\frac{1}{8}$	E. N. E. the same.
	5	9	29 $\frac{1}{8}$	the same.
	6	9	29 $\frac{1}{8}$	the same.
	7	9	29 $\frac{1}{8}$	the same.
	8	9	29 $\frac{1}{8}$	the same, less wind.
	4	29 $\frac{1}{8}$		close weather.
	9	9	29 $\frac{1}{8}$ $\frac{1}{2}$	wind little, with showers.
	10	9	29 $\frac{1}{8}$ $\frac{1}{2}$	clear strong wind.
	11	9	29 $\frac{1}{8}$	the same.

June

	Hour.	Degrees.	Wind.	Weather in Barbados.
June	12	9	29 $\frac{1}{10}$	E. clear strong wind.
		4	29 $\frac{1}{10}$	the same.
	13	9	29 $\frac{1}{10}$	E. clouds and rain.
		4	29 $\frac{1}{10}$	b. N. the same.
	14	9	29 $\frac{1}{10}$	showers and great wind.
	15	9	29 $\frac{1}{10}$	the same.
	16	9	29 $\frac{1}{10}$	the same.
	17	9	29 $\frac{1}{10}$	the same.
	18	9	29 $\frac{1}{10}$	E. N. E. the same.
	19	9	29 $\frac{1}{10}$	fairer, and strong wind.
	20	9	29 $\frac{1}{10}$	the same.
	21	9	29 $\frac{1}{10}$	the same.
	22	9	29 $\frac{1}{10}$	the same.
	23	9	29 $\frac{1}{10}$	the same.
	24	9	29 $\frac{1}{10}$	the same.
	25	9	29 $\frac{1}{10}$	the same.
	26	9	29 $\frac{1}{10}$	the same.
		4	29 $\frac{1}{10}$	the same.
	27	9	29 $\frac{1}{10}$	the same.
	28	9	29 $\frac{1}{10}$	the same.
	29	9	29 $\frac{1}{10}$	the same.
	30	9	29 $\frac{1}{10}$	the same.
July	1	9	29 $\frac{1}{10}$	E. b. N. cloudy, showers, strong wind.
	2	9	29 $\frac{1}{10}$	E. N. E. more dry, and great wind.
	3	9	29 $\frac{1}{10}$	the same.
	4	9	29 $\frac{1}{10}$	E. b. N. many showers, great wind.
	5	9	29 $\frac{1}{10}$	showers, fogs, like wind.
	6	9	29 $\frac{1}{10}$	E. changable, much wind.
	7	9	29 $\frac{1}{10}$	much rain and wind.
	8	9	29 $\frac{1}{10}$	E. b. N. clear and fairer, less wind.
	9	9	29 $\frac{1}{10}$	E. fairer, and windy.
	10	9	29 $\frac{1}{10}$	the same.
		4	29 $\frac{1}{10}$	changable, and very strong wind.
	11	9	29 $\frac{1}{10}$	E. b. S. much rain, thunder and lightning.
	12	9	29 $\frac{1}{10}$	a storm about 5 this morn. of $\frac{1}{2}$ an
		4	29 $\frac{1}{10}$	dry, and pretty fair. [hour.
	13	9	29 $\frac{1}{10}$	fair, less wind.
		4	29 $\frac{1}{10}$	the same.
	14	9	29 $\frac{1}{10}$	E. N. E. close weather, much rain.
		4	29 $\frac{1}{10}$	E. S. E. much rain, some gusts:
	15	9	29 $\frac{1}{10}$	the same.
	16	9	29 $\frac{1}{10}$	E. b. N. clear, and moderate wind.
	17	9	29 $\frac{1}{10}$	the same.
	18	9	29 $\frac{1}{10}$	the same.
		4	29 $\frac{1}{10}$	the same.

July.

	Hour.	Degrees.	Wind.	Weather in Barbados.
July	19	9	$29\frac{1}{15}$ E.	cloudy, many showers, great
		4	$29\frac{1}{15}$ $\frac{1}{4}$	the same. [wind.
	20	9	$29\frac{1}{15}$ $\frac{1}{4}$	cloudy, gusts, much rain.
		4	$29\frac{1}{15}$ $\frac{1}{4}$	much rain, great gusts.
	21	9	$29\frac{1}{15}$ $\frac{1}{4}$	the same.
	22	9	$29\frac{1}{15}$ $\frac{1}{4}$	more fair, wind more moderate.
	23	9	$29\frac{1}{15}$ $\frac{1}{4}$	the same.
	24	9	$29\frac{1}{15}$ E. b. N.	fair and clear, little wind.
	25	9	$29\frac{1}{15}$	the same.
	26	9	$29\frac{1}{15}$	clear, and stronger wind.
	27	9	$29\frac{1}{15}$ $\frac{1}{4}$	showers, and the like wind.
	28	9	$29\frac{1}{15}$ E.	fair and dry, great wind.
	29	9	$29\frac{1}{15}$	the same.
	30	9	$29\frac{1}{15}$	the same.
August	31	9	$29\frac{1}{15}$	the same.
		4	$29\frac{1}{15}$	cloudy.
	1	9	$29\frac{1}{15}$ $\frac{1}{4}$ E. N. E.	changable.
	2	9	$29\frac{1}{15}$ $\frac{1}{4}$ N. E.	cloudy, showers, & gusts of wind.
		12	$29\frac{1}{15}$ N.	much rain, fierce wind.
		2	$28\frac{1}{15}$ N. W.	storm continues, and encreaseth.
		3	$28\frac{1}{15}$ W.	the same.
		6	$29\frac{1}{15}$	more violent.
		8	$29\frac{1}{15}$ $\frac{1}{4}$ S. W.	the same.
		10	$29\frac{1}{15}$	} most violent, with terrible thun- der and lightning.
		1	$29\frac{1}{15}$ S.	
		6	$29\frac{1}{15}$ S. E.	most violent rain.
	3	9	$29\frac{1}{15}$	the storm well ceased.
	4	9	$29\frac{1}{15}$ E.	fair, clear, moderate weather.
	5	9	$29\frac{1}{15}$	the same.
	6	9	$29\frac{1}{15}$	the same.
	7	9	$29\frac{1}{15}$	the same.
	8	9	$29\frac{1}{15}$ E. b. N.	the same.
	9	9	$29\frac{1}{15}$ E. N. E.	hot and dry, little wind.
	10	9	$29\frac{1}{15}$	the same.
	11	9	$29\frac{1}{15}$	the same.
	12	9	$29\frac{1}{15}$ $\frac{1}{4}$	clear, and calm.
	13	9	$29\frac{1}{15}$	the same.
	14	9	$29\frac{1}{15}$ N. E.	some showers, little wind.

Dr. CROUNE was desired to return the Society's thanks to Col. SHARP, and to desire him to continue to prosecute these observations, and communicate them to the Society.

Dr. CROUNE desired, that a copy might be made of these observations, to be sent to Mr. TOWNLEY; which was accordingly ordered.

• He

He took notice, that the changes of the barometer at Barbados were not so great as at Tangier; and those at Tangier very much less than those in England.

Mr. HALLEY affirmed, that the changes of the barometer at St. Helena were very little, and much less than those at Tangier: and that the greatest variations in England were caused by the north-west winds.

Sir ROBERT REDDING said, that he had an account of several observations made at London and in Dublin at the same time; which he promised to communicate.

A paper of Mr. TOWNLEY's observations was produced; and Dr. CROUNE remarked, that he had found by them, that the weather was not the same both here and where Mr. TOWNLEY had made those observations, though the changes of the barometers were not different.

Mr. HOOKE produced a letter to himself from Mr. JUSTEL, dated at Paris 21 Aug. 1680. N. S.\* giving an account of an astronomical instrument invented by Monsr. ROEMER for finding the positions of the heavens at all times, either past, present, or to come, performed by clock-work within to be turned with the hand: as also such an instrument invented by CASSINI, but without wheel-work, and to be set by the help of tables. Monsr. JUSTEL mentioned likewise, that Monsr. PICART was gone to Bayonne with Messrs DE LA HIRE and DU VERNAY, the first being employed to observe the longitudes of different places in France: that a friend of his had received from Poland an account of a journey of some Muscovites to China in 1674 and 1675; of which Monsr. JUSTEL was promised a copy, with several other articles of literary intelligence.

Dr. CROUNE produced a letter of Mr. PULLEYN, dated at Rome, giving an account of a new physico-mathematical academy founded by Signor CHAMPIGNI; and mentioning, that he would correspond with the Society: that he had sent some tracts as a present, and would continue to send such pieces, as should be published, that were curious, as BORELLI's book, when finished. This letter took notice of some things printing at Rome: of a balsam made by Signor CHAMPIGNI: of a parcel of rare seeds sent by Mr. UPTON for Oxford from BOCCONE: of the poverty of BOCCONE, and what would be an encouragement to him to make farther search for natural curiosities: and of a sort of lithanthrax, sent among other things, and found in a crack of the Apennine mountains. This letter promised likewise to settle a correspondence with Signor PTTIATTI and Signor TOMASO CORNELIO, two learned men at Naples.

Dr. TYSON produced several sorts of hair, which had been taken out of the ovarium by Dr. SAMPSON, of which an account had been printed in the *Philosophical Collections*†.

Mr. HOOKE shewed a letter of Mr. BOYLE, sent to him during the late recess

\* Letter-Book, Vol. viii. p. 135.

† N° 2. p. 49.

of the Society, wherein was contained some secret, which the author desired might not be opened but by his own permission.

*Novemb. 11.* Sir JOHN HOSKYNs was desired to take the chair, on account of the absence of the president and vice-presidents.

The minutes of the last meeting were read: whereupon Dr. CROUNE was desired to write to Mr. TOWNLEY and Col. SHARP, to make observations of the barometer at the same time; and he moved, that a thermometer might be sent to Col. SHARP, to observe the changes of heat and cold by that instrument: upon which Mr. HUNT was ordered to make one.

Mr. HOOKE presented from ROBERT SOUTHWELL two books of Signor VIVIANI, *De maximis et minimis*, and *De duplicatione Cubi*.

Mr. AUBREY presented a book in octavo, intituled, THOMÆ HOBBS *Angli Malmesburiensis philosophi vita*.

Mr. HOOKE produced a long letter lately received by him from Mr. LEWENHOECK. It was written in Low Dutch; but the contents of the several heads were read by Mr. HOOKE. It was desired, that the said letter should be translated and answered.

Mr. PERRY shewed a catalogue of Mr. ENT's books presented to the Society. It was desired, that a fair copy of it should be made, in order to lie in the library.

*Novemb. 25,* at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, vice-president,	
Mr. HENSHAW	Dr. GREW
Mr. HILL	Dr. KING
Mr. COLWALL	Mr. HOOKE.
Mr. PARKER	

It was ordered, that Mr. HENSHAW should have lawful power and authority from the Society to treat and agree with Mr. THOMAS FRANKLIN for the arable ground belonging to Chelsea-College, at the rate of 32 s. an acre *per annum*, for a term of 21 years; and, in order to ascertain the quantity thereof, Mr. HUNT was desired forthwith to make an admeasurement thereof: and Sir JOHN HOSKYNs was desired to get a lease drawn up with necessary provisions, covenants, &c.

Mr. HILL brought in the following paper concerning the books of Mr. ENT, delivered to the Society by Mr. EVERARD, *viz.*

“Whereas GEORGE ENT, of the Middle-Temple, Esq; deceased, did give  
“his books in the catalogue hereunto annexed to the Royal Society of London,  
“and

" and made Mr. WILLIAM EVERARD of Middlesex, gentleman, the executor  
" of his last will and testament : These are to acknowledge the receipt of the said  
" books by order of the Royal Society ; and the said Royal Society doth hereby  
" promise, that if any controversy shall arise in law, which may alter the pos-  
" session of the aforesaid books, that then they will return the said books to the  
" said Mr. WILLIAM EVERARD, as he hath now delivered them.  
" Dated the                      day of

It was agreed by the Council, and ordered, that a copy of this paper be delivered to Mr. EVERARD, to be signed by the secretary.

It was ordered, that the arrears of Mr. AVERY be considered, and that for the future the said Mr. AVERY be not charged with the usual payments.

*November 25.* Many members of the Society met; but there was none in the chair.

Mr. ASTON took Mr. LEEWENHOECK's last letter, and promised to translate it into English.

Mr. HOOKE introduced Mr. MEESTER, who explained his water-level ; a print and description whereof were presented by Mr. HOOKE for the use of the Society.

Dr. GALE delivered in from Dr. WALLIS the two last lectures, which he had read before the Society concerning the time of Easter. Dr. GALE was desired to return the Society's thanks to Dr. WALLIS, with their earnest request, that he would publish those lectures ; of which Sir CYRIL WYCHE desired the perusal for a short time, which was granted.

Mr. HOOKE produced and read a letter to himself from Mr. PULLEYN, dated at Padua in the month of November.

Dr. GALE was desired to write to Mr. PULLEYN, when the latter should be arrived at Madrid.

Mr. HOOKE gave an account of the particular observations of the innermost satellite of JUPITER, recommended to him by Monsr. TOINARD, to be observed by the English astronomers, who might correspond with the French astronomers ; together with an account of several observations made by Mr. FLAMSTEAD at Greenwich ; which he designed to send to Paris.

Mr. HOOKE gave a particular relation concerning his observations made on the Monday morning and Tuesday morning before of a new comet appearing in the beginning of the sign Scorpio a little to the southward of the ecliptic : That  
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its motion was eastward, and halted towards the sun ; and that it would not be seen either on Wednesday or Thursday morning because of the thickness of the air.<sup>1</sup>

Hereupon Mr. HILL remarked, that he had been informed by Sir ROBERT MORAY, that monf. MARIOTTE had in his life time seen nine comets ; and that of these nine he had predicted when seven should appear.

Monf. AUZOUT was said to be the first, who had printed ephemerides of the comet in 1664, though upon grounds very improbable. But Sir CHRISTOPHER WREN was the first, who found out and demonstrated the true way of making ephemerides of all the way of the comet from any four observations.

November 30. the day of the anniversary election, of which there is no entry in the journal. But it appears from the council books, that the eleven members of the old council, who were continued of it, were

Mr. COLWALL  
Dr. CROUNE  
Dr. GALE  
Dr. GREW  
Mr. HENSAAW  
Mr. HILL

Mr. HOOKE  
Sir JOHN HOSKYNs  
Mr. PERRY  
Sir JOSEPH WILLIAMSON  
Sir CHRISTOPHER WREN.

And that nine of the ten new members of the COUNCIL were

Mr. ASTON  
Mr. BOYLE  
Mr. CREED  
Sir JOHN LAWRENCE  
Dr. KING

Sir JOHN LOWTHER  
Dr. PLOT  
Sir THEODORE DE VAUX  
Sir CYRIL WYCHE.

Mr. BOYLE was chosen president ;<sup>\*</sup> but declining by a letter to Mr. HOOKE, dated Pall-mall 18 Decemb. 1680, to accept of that office, and desiring the Society to proceed to a new election of a president, Sir CHRISTOPHER WREN was elected into that post, into which he was sworn at the council held 12 January, 1680.

Mr. HILL was rechosen treasurer at this anniversary election, as Dr. GALE and Mr. HOOKE were the two secretaries.

Not long before this anniversary election died an eminent member of the Society,

JOSEPH GLANVILL, B. D. born at Plymouth in Devonshire about the year 1636,<sup>\*</sup> and educated in Exeter College in Oxford, where he became bailer, and

<sup>\*</sup> See Mr. HOOKE's posthumous works, p.

250, 251.

<sup>153</sup> See life of the honourable Mr. BOYLE, p.

<sup>\*</sup> Mr. Wood, Athen. Oxon. Vol. II, Fol 662. says, that he was sixteen years of age in 1652.

entered

entered into commons April 19, 1652, under a very able tutor, SAMUEL CONANT, M. A. He took the degree of bachelor of arts October 11, 1655<sup>a</sup>, and in July the year following removed to Lincoln College, where he took the degree of master of arts June 29, 1658.<sup>a</sup> Soon after this he was invited to live with FRANCIS ROUS, Esq; provost of Eton college, as his chaplain; which offer he accepted of, and resided somewhat above half a year at Mr. Rous's house: Upon whose death on the 7th of January 1658<sup>b</sup> Mr. GLANVILL returned to Oxford, and continued for some time at Lincoln college\*. His first work was published at London in 1661, in 8vo, and intitled, *The vanity of dogmatizing, or confidence in opinions, manifested in a discourse of the shortness and uncertainty of our knowledge and its causes: With some reflexions on peripateticism, and an apology for philosophy*; in the dedication to which, dated at Cecil-house in the Strand, March 11, 1660, he mentions his having written a discourse of *the soul's immortality*, and designed a preface to it, as a *corrective to enthusiasm*, in a vindication of the use of reason in matters of religion: But that the latter was rendered less necessary by the king's much desired and seasonable arrival, and the former by the maturer undertakings of the accomplished Dr. HENRY MORE. At the restoration he took orders from Dr. SANDERSON, bishop of Lincoln.<sup>c</sup> The second piece published by him was at London 1662, in 8vo, under the title of *Lux Orientalis: or, an enquiry into the opinion of the eastern sages concerning the pre-existence of souls, being a key to unlock the grand mysteries of religion*. In the beginning of November 1662 he was presented by Sir JAMES THYNNE to the vicarage of Frome-Selwood in Somersetshire in the room of Mr. JOHN HUMPHREY, deprived for non-conformity. December 14th 1664 he was chosen fellow of the Royal Society, to whom the year following he dedicated his *Scepſis Scientifica, or, confess ignorance the way to science: In an essay of the vanity of dogmatizing a confident opinion: With a reply to the exceptions of the learned THOMAS ALBIUS*: printed at London in 4to. In June 1666 he became rector of the great church in Bath. The same year he published at London in 4to, *Some philosophical considerations touching the being of witches and witchcraft*: but all, or most of the impression being burnt in the fire of London in the beginning of September of that year, it was reprinted in 1667 in 4to, and the fourth edition of it appeared in 1668 in 8vo. These *Philosophical Considerations* were answered by Mr. JOHN WEBSTER in his *Display of supposed witchcraft, &c.* London 1667 in fol. In 1668 Mr. GLANVILL published at London in 8vo his *Plus ultra: or, the progress and advancement of knowledge since the days of Aristotle, &c.* which engaged him in a controversy with Mr. HENRY STUBBE of Warwick, and occasioned his *Prefatory Answer* to Mr. STUBBE, printed at London 1671 in 8vo, and his *Farther Discovery of Mr. Stubbe*, printed the same year. In July 1672, he exchanged his vicarage of Frome for the rectory of Streat, with the chapel of Walton annexed, in Somersetshire. About this time he was made chaplain to the king, and in June 1678 installed canon of Worcester, which dignity he obtained by the interest of HENRY marquis of Worcester, to whom Mr. GLANVILL's wife claimed some relation: He died at his house at Bath October 4, 1680, and was interred in his church there on the 9th of that month, his funeral sermon being preached by Mr. JOSEPH

<sup>a</sup> Mr. Wood, Fasti Oxon. Vol. ii. Fol. 107.

<sup>b</sup> Mr. Wren, Act. Oxon. Vol. ii. Fol. 232.

<sup>c</sup> Ibid. Fol. 122.

<sup>d</sup> Id. Fol. 662.

<sup>e</sup> Mr. GLANVILL's *Farther discovery* of Mr. STUBBE, p. 31.

<sup>f</sup> *Farther discovery* of Mr. STUBBE, p. 32.

PLEYDELL, archdeacon of Chichester. Besides his works abovementiond, he published several others; an account of which may be seen in Mr. Wood's *Athenæ Oxon.* He was a man of very lively genius and extensive learning, and a zealous advocate for the new against the old scholastic philosophy, and for religion against the extremes of enthusiasm and scepticism.

December 2, Mr. HENSHAW in the chair.

The minutes of the preceding meeting were read; after which Dr. PAMAN produced and showed a very large calculus taken out of a horse, which at first was larger and heavier than it was now; for at its being taken out it weighed four pounds four ounces; but being now weighed, it was found to weigh but three pounds nine ounces and a quarter. It was somewhat of the fashion of a turnip, and was twenty one inches about, and five inches and a quarter in thickness. It was for the most part rough and spongy; but some few spots of it were smooth and slick like a bezoar. The doctor read a discourse of it, giving an account of the age, use, manner of feeding, and death of the horse; and of the place where it was found, which was not in the bladder; together with various conjectures concerning the cause and manner of its production. This discourse was ordered to be entered into the register book<sup>4</sup>.

Mr. HOOKE read a letter, which he had sent by Mr. HALLEY to Mons<sup>r</sup> JUSTEL at Paris.

Dr. PAPIN produced his boiling engine, and shewed the process of boiling gooseberries therein, which had been preserved since Midsummer preceding; together with the manner of making jelly of hartshorn the same way in his engine.

Decemb. 8, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN	Dr. PLOT
Mr. BOYLE	Dr. GALE
Mr. HILL	Mr. PERRY
Mr. COLWALL	Mr. HOOKE.

It was ordered, that a book, intituled, *The Digest: or, the description of an engine for softening of bones*, written by DENYS PAPIN, doctor of physic, and fellow of the Society, be printed and published:

That henceforth the weekly meetings of the Society be kept upon Wednesdays in the afternoon at four o'clock; and that summonis be sent out accordingly against Wednesday next:

That the secretary send Mr. NEWTON an answer to his letter, that the Society give their consent for the Italian<sup>5</sup> to dedicate his book, &c. And

That Dr. GALE write a letter to Sir JOSEPH WILLIAMSON in answer to his letter to Sir JOHN LOWTHER.

<sup>4</sup> It does not appear there.

<sup>5</sup> GASPARINI. See the minutes of the Society of Decemb. 16.

Decemb. 9. Very few members of the Society meeting, there was nothing read; only Mr. HOOKE brought in a book published and presented by Mr. BOYLE, intitled, *The Aerial Noëtiluca: or, some new phenomena, and a proof of a fastitious, self-shining substance.*

Decemb. 16. Mr. HENSHAW, vice-president, in the chair.

Mr. HOOKE read a letter to himself from Mr. NEWTON, dated at Cambridge 3 Decemb. 1680, giving an account, that DOMINICO GASPARINI, doctor of physick of Lucca in Italy, had lately written a treatise of the method of administering the *Cortex Peruvianus* in fevers, in which he particularly discussed, whether it might be administered in malignant fevers; and also whether in any fevers before the fourteenth day of sickness; and that upon the fame of the Royal Society spread every where abroad, he was ambitious to submit his discourse to so great and authentic a judgment as that of the Society; and thereupon desired another doctor of physick of his acquaintance in Italy to write to his correspondent an Italian in London, to move, that the Society would give him leave to dedicate his book to them. The said Italian being gone from London to Cambridge before the arrival of the letters, on the receipt of them applied himself to Mr. NEWTON, who promised him, that he would desire Mr. HOOKE to acquaint the Society with Dr. GASPARINI's request. Mr. NEWTON added in this letter his thanks to Mr. HOOKE for the trials, which the latter had made of an experiment suggested by the former about falling bodies.

Mr. HOOKE was desired to answer Mr. NEWTON's letter, which he did in one dated 18 Decemb. 1680, in which he took notice, that the Society was pleased with the subject of Dr. GASPARINI's book, the *Cortex Peruvianus* being a specific, which had of late been much discoursed of, and concerning which an ingenious physician of London, Dr. GOODALL, was then publishing a discourse, wherein he would endeavour to give a true account of the production and use of the *Cortex*, so far as he could be informed from writers, travellers, or his own experience. That as to Dr. GASPARINI's dedication of his book to the Society, he needed no leave, things of that nature being usually done without asking a consent; but that doubtless the Society could not but be very well pleased with the testimonies of respect from learned and ingenious persons, of which nature this was supposed to be: And therefore though they did not invite or prompt any persons to such addresses, yet the author needed not to doubt of finding such an acceptance and resentment thereof by the Society, as might answer his expectations.

Dr. SLARE was introduced by Mr. HOOKE, and having subscribed the obligation was admitted Fellow of the Society.

Mr. HOOKE produced the first sheets of Mr. DETHLERUS CLUVERUS's Ephemerides presented by Mr. HAAK, containing a summary of his whole design in that undertaking; which being read was approved of.

\* Letter-Book, Vol. viii. p. 139.

\* Ibid. p. 140.

A letter to Mr. HAAK from Dr. ARNOLDUS, dated at Leyden  $\frac{17}{11}$  Decemb. 1680, was read; wherein, amongst other considerable remarks, an account was given, that there was printing at Amsterdam a body of anatomy illustrated with figures of all the parts of the body as big as the life, curiously engraved in copper: And that Dr. PAUL HERMANNUS, a German and professor of botany at Leyden, was printing an herbal of all the Zeylon plants, he having lived in that island eight years: And that some curious naturalists at Leyden had found without the walls of that city scorpions with wings.

Dr. GALE produced a letter to himself from Dr. WALLIS, dated at Oxford 14 Dec. 1680<sup>a</sup>, which was read, giving an account of the tail of the comet's having been seen there on the Friday, Saturday and Sunday night before, the 10, 11, and 12th instant. That the head, as he supposed from the situation of the tail, might be about the head of sagittarius, or the centaur, but so near the sun, that it set before the night was dark enough to see it: That the tail was long, slender, and pointed, reaching almost to the zenith, pointing towards Medusa's head, or thereabouts: But Dr. WALLIS not having seen the head, took no accurate notice of it. He guessed, that it might have been seen some weeks before as a morning comet on the other side of the sun; since which time it had been in conjunction with the sun, and would shortly (being then eastward of him) come to be seen soon after sun-set, at least if its motion were any thing quick. That the last night being cloudy, the comet was not seen.

Dr. GALE was desired to request Dr. WALLIS to communicate such further observations on the comet, as should be made at Oxford.

Hereupon a discourse was held concerning the comet, and Mr. HOOKE related what observations he had made concerning it, and what he conjectured concerning its place, motion, duration, &c. none of which could be positively determined till some farther observations had informed him more particularly.

Mention being made of the shining of diamonds, Mr. HENSHAW related, that it was conceived, that the shining of that diamond, in which this property was first observed, was conjectured to proceed from the manner of its being set in the ring: And though it were very ill set as to appearance, whilst it was in his possession, yet after the king had bought it of him for 20 *l.* the jewellers durst not new set it for fear of spoiling that shining quality.

An experiment was tried for examining the electricity of glafs after Mr. NEWTON's method, by rubbing one side of a glafs to make the other attract: But it was found, that though at first it succeeded two or three times, yet afterwards, for what reason could not be discovered, it did not succeed: so that the experiments designed to be made farther with it could not be tried, which were to examine, whether the air were of any use for performing this operation; or whether the air being exhausted from one side of the glafs, the same effect would not be produced on the bodies placed nearer it.

<sup>a</sup> Letter-Book, Vol. viii. p. 141.

It was therefore ordered to be prepared with thinner glasses against the next meeting, that so the experiment might be more certainly made, for that it was supposed, that the uncertainty of its operation proceeded from the thickness of the glass, which was rubbed.

Mr. BOYLE's book on the *Noctiluca* presented at the last meeting was now produced, and some parts thereof read and discoursed of.

Mr. HOUGHTON propos'd three persons for candidates, viz. Mr. GOODWIN, a Portugal merchant, Mr. BRADDON, a student of law, and Mr. OLIVER SALISBURY of the Middle Temple.

Decemb. 23, the Society dining together this day had no meeting at the usual place.

1681, January 12, a meeting of the COUNCIL, were present,

Sir CHRISTOPHER WREN, President,	
Sir JOHN LOWTHER	Mr. COLWALL
Sir JOHN LAURENCE	Mr. ASTON
Sir JOHN HOSKYNs	Mr. PERRY
Mr. HILL	Mr. HOOKE.

Sir JOHN LOWTHER was sworn of the Council.

Sir CHRISTOPHER WREN was sworn president, who deputed Sir JOHN HOSKYNs vice-president for the year ensuing: upon which Sir JOHN HOSKYNs was sworn vice-president.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN presided in the chair.

A letter sent by Mr. BOYLE was read, containing an account of a strange hurricane at Hanau in November 1680. It was signed WILLIAM BYTHASIA.

A letter to Mr. HOOKE from Mr. PASCALL, dated at Chedsey in Somersetshire 4 January 1681 was read, giving an account of an earthquake, which had happened the day before at Chedsey and other contiguous places; and of the comet now appearing.

Hereupon the president discoursed concerning the cause of earthquakes; that he conceived, that many of those, which only shook the earth, and did not break the earth, were occasioned by some vast subterraneous caverns, into which some great impending parts of the upper parts might fall into the lower, and thereby make that great dead noise and trembling, which is sensible in the surface of the earth contiguous thereto: And that hence the reason might be given, why after some earthquakes there have been found divers parts of the ground sunk, which

which are sometimes also filled with water, and so make a lake or stagnum. And he was of opinion, that there might be some general constitution of the ather, that might be the cause as well of the earthquake as of the storm and comet.

Mr. HOOKE read a letter to himself from Monsr. LEIBNITZ, containing several ingenious conjectures, about the use of an universal language and character; as also of an universal algebra, and the great benefit thereof; and that by the help thereof he had been able to perform very many considerable things, which the commonly known algebra would no way enable him to do, &c.

Mr. HOOKE was desired to continue his correspondence with mons. LEIBNITZ, and to endeavour to prevail with him so far, as to procure from him some instance or experiment of these his new problems.

Mr. HOOKE produced also a letter to himself from Monsr. JUSTEL, dated at Paris 1 January 1681, N. S. wherein he gives the reason, why he could not yet send the description of a small printing engine newly invented; nor the account of the journey from Moscow to China; but that Monsr. THEVENOT had translated it from the Russian language into French, and was now printing it: That Monsr. PICART was printing an account of his voyages, and the observations made by him at Copenhagen, Montpellier, Bourdeaux and Brest; to which he would add his treatise of the measures of the earth: That mons. ROEMER was returning to Denmark, being recalled thither: That Monsr. MARIOTTE had in the press a treatise on colours: That the comet had been observed but three times at Paris; and that the astronomers there judged it to be 62 degrees long, and to move two degrees a day: That it appeared small, and that the cloudy weather prevented it from being observed: That CASSINI affirmed, that just such a comet had appeared three hundred years before: That Monsr. DU VERNAY had not yet shewn his friends the observations, which he had made on the dissection of the fishes, which he had met with on the coast of Bourdeaux; but that he had not seen any whale: That the drawings of what had been dissected were made by Monsr. DE LA HIRE with the utmost exactness: That there would be an account of the comet in an almanac printing in Paris, which contained several curious things, and particularly the longitudes and latitudes of places, as corrected by late observations: That Monsr. CHAMARS was busy in making experiments on the magnet: That KUNKELL, who invented the liquid phosphorus, had left Saxony, and was gone for Poland.

Mr. ASTON having translated a long letter of Mr. LEEWENHOECK from Low Dutch into English, part of it was read, containing divers observations on the lees of ale and wine; and the remainder was referred to the next meeting.

Mr. HOOKE shewed a piece of a talipot leaf, which one Mr. KNOX, who had been nineteen years and an half captive in Ceylon, had brought with him from thence. It was about seven feet long and nine feet wide at one end, shaped like a woman's fan, closing and opening like that. The whole leaf was said to be a circle of twenty feet diameter.

Dr.

1 Letter-Book, Vol. viii. p. 147.

Dr. RUSSEL was proposed candidate by Mr. HOUGHTON.

January 19, at a meeting of the COUNCIL were present

	Sir CHRISTOPHER WREN president,
Sir JOHN HOSKINS	Mr. CREED
Sir THEODORE DE VAUX	Mr. ASTON
Mr. HILL	Dr. CROUNE
Mr. COLWALL	Mr. HOOKE

The president moved, 1. that there might be an anatomical committee: to which Dr. CROUNE objected the college of physicians:

2. A georgical committee:

3. A cosmographical committee to register all things, that should be remarkable.

It was resolved, that these three committees should be appointed; and that the president should consider of fit persons to be of the said committees, and to draw up some directions for what they are to consider.

At a meeting of the Society on the same day; the president in the chair.

The minutes of the 12th instant were read. Whereupon there was occasioned a discourse about earthquakes; and Mr. HILL related, that he had been certainly informed, that there was an earthquake at Morocco the same day that there was one at Malaga; and that it happened at Morocco just at eight o'clock in the morning.

Dr. ROBERT WOOD, LL. D. was propounded candidate by the president, HUGH CHAMBERLAYNE, M. D. by Mr. HOUGHTON, and JOHN PHILIP JORDIS, M. D. of Francfort by Dr. SLARE.

On occasion of Monf. LEIBNITZ's letter, the president and Sir John Hoskyns discoursed about the universal algebra mentioned by him; and they supposed, that it might be somewhat like the *ars Lulliana*; but did not conceive, that it could be of so great use, as monf. LEIBNITZ seemed to imagine.

Mr. HILL remarked, that professor STURMIUS had written an *Euclides Universalis* somewhat to this purpose; and that he had the book now by him.

The president acquainted the Society with the undertaking of Mr. JOHN ADAMS to survey all England, by measuring, taking angles, and also the latitudes of places; and in order to this running three several meridians clear through England: that Mr. NEWTON of Cambridge had promised to assist him; and that he designed the next week to wait on the Society, in order to desire their directions and assistance.

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Some discourse arose about the comet; and Mr. HILL observed, that CALPHURNIUS the poet, who lived in the time of CARINUS, had mentioned a comet not taken notice of in writers of astronomy.

The president mentioned, that the fire-ball, which had formerly been seen in England, might possibly be a sublunary comet.

A letter of Sir THEODORE DE VAUX was read, giving an account of some apparitions, that had been lately seen in the air like armies fighting: that the fire was seen, and noise heard like the discharging of guns, and afterwards great groanings were heard.

The president said, that he had formerly seen a very pretty scene upon the opening of the clouds, and flashes of lightning running to a fro between them.

Sir THEODORE DE VAUX said, that Sir HERBERT PERROT had lately seen three suns and two moons at Swansey in Pembroke-shire.

Mr. HILL related, that a friend of Mr. MOSES had lately given him an account out of Somersetshire, that fighting in the air had been seen there.

Mr. THOMAS HILL's paper concerning comets<sup>a</sup> sent by Dr. TILLOTSON was perused, and ordered to be copied.

Mr. CLUVERUS delivered in two printed papers sent by Signior SAROTTI, printed in Italy, concerning the comet. One of them being in Latin was read, but it consisted most of predictions; as upon perusing, the other also was found to consist of the same, and to contain very little or nothing of considerable observation.

A large pair of moose deer horns were presented by Mr. BOYLE for the repository.

Mr. HOOKE shewed his instrument for making experiments in order to find out the attractive power of the load-stone at several distances, and to reduce that power to a certain theory.

January 26, Sir JOHN HOSKYNs vice-president in the chair.

Mr. JOHN ADAMS of the Inner Temple was introduced by Dr. GREW; his business being to desire the advice and directions of the Society in an undertaking, which he was engaged in, a perfect survey of England. He said, that he had already had the advice of the president, Mr. HOOKE and Mr. FLAMSTEAD concerning it.

<sup>a</sup> This paper is probably that mentioned in a letter of Dr. TILLOTSON to ROBERT NELSON, Esq; dated at London 7 March, 1630, in which he inclosed that paper for Mr. HALLEY then

with Mr. NELSON at Paris. He files this Mr. HILL of Canterbury not a learned, but an industrious man. See the life of Archbishop TILLOTSON, p. 82. 2d edit. London 1753, 8vo.

Sir JOHN HOSKYNs advised him, besides the geographical descriptions, to make also a topographical one of all the principal seats and buildings, and to take an account of the bigness and currents of rivers, &c.

Mr. ADAMS said, that he would from time to time desire and follow the directions of the Society in prosecuting this undertaking.

Dr. PAPIN presented a book of his dedicated to the Society, intitled *A new Digest*, &c.

Mr. HOOKE produced the present, which he had received from Signor MALPIGHI, being several books lately printed in Italy, together with his picture very well painted, as big as the life. The books were as follow :

Ragguagli del P. ESCHINARDI.  
Redi del Ochiale.  
P. BARTOLI del suono.  
Montalbani & Præctica Minerale.  
Sangallo della Zanzani.  
Dialogo circa il sistema Copernicans.  
Rubei Epigrammata.  
Lettione academica del Montanari.  
Manualletto del Bombesii della Steffo.  
Acta thesium Bononica.  
L'Inde del Barbari.

Mr. ASTON undertook to peruse Sangallo della Zanzani, and to give an account thereof to the Society at their next meeting.

It was ordered, that a frame should be made for the picture of Signor MALPIGHI: and a motion being made, that it might be engraven, Mr. HOOKE was desired to speak with Mr. LOGGAN or Mr. FAITHORNE concerning it.

February 2, The president in the chair.

The president gave an account of an accident of one Mr. HAMPSHIRE, who being very much troubled with a canine appetite, and his wife with a design of poisoning him giving him arsenic, it made him vomit violently, and thereby cleared him of both.

Upon discoursing concerning the comet the president observed, that there were two comets; and that the last was different from the first: that he had from Mr. FLAMSTEAD's observations tried the way of it, and found it to agree with his hypothesis, that comets move in straight lines equal spaces in equal times, but not according to KEPLER's hypothesis.

Mr. HOOKE gave an account, that he had spoken with Mr. LOGGAN concerning  
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the engraving of Signor MALPIGHI's picture; and that he had seen it, and was willing to undertake it.

Upon this occasion Dr. GALE moved, that the duke of NORFOLK's picture might be prefixed to the catalogue of the library then printing.

A letter from Mr. JUSTEL to Mr. HOOKE, dated at Paris January 1678, was read; as also a short account of the ephemerides of the late comet. It was desired, that Mr. HOOKE should send to Mr. JUSTEL in the name of the Society Mr. BOYLE's *Noctiluca* and Dr. PAPIN's book on the *new Digester*.

Mr. ASTON returned *Sangallo della Zanzani*, and gave an account, that there was very little in the book new, but that the author's design was only to shew, that gnats were not produced of the mud of water, but from eggs: that most of the observations were the same with those published by Mr. HOOKE in his *Micrographia* and by SWAMMERDAM in his book on insects.

The books presented by Signor MALPIGHI being now either stitched or bound, several of them were recommended to several of the members present to peruse and give an account of to the Society: and according Sir JOHN HOSKYNs took *Practica Minerale*; Dr. GALE RUBEUS's poems; Sir CHRISTOPHER WREN BARTOLI *del suono*, and *Ragguagli del Eschinardi*, and Mr. ASTON *Radi del Occhio*.

A paper of Mr. HAAK, giving an account of his experiments about recovering and increasing the attractive virtue of the magnet, was read.

Mr. HOOKE was desired to think of some fit books to send to Signor MALPIGHI for a present from the Society.

February 9, Sir JOHN HOSKYNs vice president in the chair.

Sir JOHN PERCIVAL was proposed by Sir ROBERT SOUTHWELL.

Sir ROBERT SOUTHWELL shewed a certain white powder, made of the lapis smaragdinus, only finely beaten, without any other preparation; which being srewed upon a copper-plate, and the plate being laid over a chafing-dish of coals till pretty warm in a dark room, the powder would shine like a glow-worm, and continue so for some time; but by degrees the light would diminish and disappear.

This was presently tried and found to answer the relation; and it was farther remarkable, that if the plate was taken off the coals, whilst the powder yet shined, as the plate grew cold, the light would diminish; but being laid on again, it would continue to shine as before. It was also observed, that a little wet sprinkled on the plate put out the light, where the powder was wet.

Sir ROBERT SOUTHWELL shewed likewise the true receipt of making the phosphorus of Mr. KUNKELL, being the same that Mr. KRAFT had formerly shewed

in England and several other places; the phenomena of which are described by Mr. BOYLE in one of the *Philosophical Collections*. Sir ROBERT had none of the substance then about him, but promised to produce it at some other meeting of the Society.

He shewed likewise a very curious piece of yellow transparent amber, in which was a large spider so intirely and exactly preserved, as if it had been yet alive; as also a rare necklace of amber beads, which were made of seven sorts of amber, that resembled speckled marks of all variety of colours, as black and white, black, white and red, white, yellow, and gray, &c. together with other curious pieces of amber of all varieties of colours, as some milk-white, called Carbridge amber, and some of brimstone-colour, and so of all varieties of whites and yellows both opaque and transparent. He related, that he had seen several other varieties exceedingly curious.

He gave a farther account of the phosphorus of BRANT, which he called *Brande Brant*, because first invented by Dr. BRANT, though claimed by KUNKELL and KRAFT. And he said, that Dr. BRANT had affirmed to him, that he knew how to prepare a shining substance as well out of vegetable as out of animal or mineral substances, particularly wine, urine and mercury; but that he had not discovered to Sir ROBERT the several ways and methods, which he used for making them.

Dr. GALE related, that there had lately happened a very strange accident to a river in Yorkshire called Burr near Massam, which was that all the fish in the said river for many miles to the entrance into the sea were poisoned or killed; the reason of which was not known, but supposed to be the breaking out of the earth of certain mineral waters; and so much the rather, because it is well known, that there were many mines of lead and coals not far distant from it.

Sir JOHN HOSKYNs observed, that quick lime thrown into water would poison the water so as to kill all the fish in a pond.

Mr. HOUGHTON produced and read a letter of Dr. BEAL about earthquakes; as also about the phosphorus proposed after a way experimented by Mr. BOYLE. Mr. HOUGHTON was desired to give a copy of this letter to the Society.

A letter of Signor NAZZARI dated at Rome 7 Decemb. 1680. was read; and it was desired, that Dr. GALE would continue the correspondence with him.

Dr. GALE gave some account of a book lately published by Mr. BURNET of Cambridge<sup>1</sup> concerning an hypothesis to solve all the phenomena of NOAH's flood consonant to the scriptures, the writings of the antients, and the Cartesian philosophy; and the doctor was desired to bring in an account of it to be printed in the *Philosophical Collections*.

<sup>1</sup> Intituled *Theoria Theoriae sacrae*, London 1681. in 4to.

<sup>2</sup> An account is given of that book N<sup>o</sup>. 3 p. 75. Decemb. 10, 1681.

Sir

Sir THEODORE DE VAUX promised to communicate a method of staining amber by sinking in of any colour and with any figure, by which the animals in amber might be curiously imitated.

Mr. HOUGHTON produced a paper of the byssus, or a kind of silk-cotton; and desired, that the Society would consider of what use it might be in trade, since great quantities thereof might be had at very reasonable rates.

Mr. ASTON returned *Redi del Occhiale*, and gave this account of it, that the author's design was to prove, that a Florentine about 400 years before had found out the use of spectacles, upon the hearing, that some other person had before that had such an invention.

Sir ROBERT SOUTHWELL remarked, that GALILEO invented telescopes upon much the like occasion of hearing, that another person had invented them.

*February 16*, being Ash-Wednesday, the Society did not meet.

*February 23*, Sir. JOHN HOSKYNs vice-president in the chair.

The minutes of the 9th instant were read.

Upon discoursing concerning the staining of amber, wood, and several other substances, Dr. CROUNE affirmed, that the black stain of wood used for coaches was observed to rot the wood, and on that account began to be disused in coaches.

Upon the occasion of discoursing about the phosphorus produced at a former meeting by Sir ROBERT SOUTHWELL, Dr. CROUNE related some observations of his own about the shining of a clean shirt, when put on very warm and rubbed with his hand: that he had often tried it, and never found it to fail.

Of all fishy substances, that shined, the eggs of a lobster, that had been boiled, were asserted to shine the strongest.

Upon discoursing of REDi's tract about spectacles it was conceived, that ROGER BACON might be the first inventor of them, since he had before the time mentioned by REDi described them, as appeared from his writings.

A paper sent in by Sir ROBERT SOUTHWELL from Mr. CRISP at St. CHRISTOPHER's was read, wherein he affirmed, that having followed the directions sent him from the Society for fitting his barometer, he found, that it had not varied then upon any change of weather. It was hereupon conceived, that he had failed in the making of his trials.

Dr. CROUNE remarked, that the barometer in Barbadoes varied but little.

Mr. HOOKE acquainted the Society with his observation on the height of the mercury

mercury on the 7th of January preceding, when, according to a paper, which he shewed, the three suns and several rainbows appeared in Sweden. Mr. Hooke's observation was, that the mercury at that instant stood higher than ever he had remarked it to do before, though he had constantly taken notice of it for near twenty years: that accordingly he had caused Mr. HUNT at that time to take notice of it, and measured it, though he knew nothing of the phenomenon in Sweden till the last week.

Dr. CROUNE brought in the seeds sent from Signor BOCCONE, part of every sort of which Dr. TYSON was desired to send to Dr. PLOT at Oxford to be sown in the physic garden there.

Mr. HAAK presented to the Society a book intitled *Eleflorale Saxonicum: auctore Tobia Bentlio*, printed at Dresden in 1671.

He delivered in a paper of Mr. HEINSIUS, which contained a catalogue of all those persons and authors, who had written concerning amber. Sir JOHN HOSKYNs took this paper to peruse, and to return it at the next meeting.

Mr. HOOKE presented to the Society Dr. PAPIN's engine for boiling bones, &c. which the doctor had left for the use of the Society. It was opened, and all the several parts of it explained by Mr. HOOKE, together with the method of fitting and using it for boiling, &c.

It was desired, that some trials should be made with this engine at the next meeting.

ROGER MEREDITH, M. A. professor of civil law in Gresham college, was proposed candidate by Mr. HOOKE.

March 2, the president in the chair.

Sir JOHN HOSKYNs gave an account of the Italian book intitled *Prattica minerale trattato del Marco Antonio della Fratta*, the substance of which he promised to put into writing against the next meeting.

The president gave an account of REDI's and BARTOLI's books, which account he promised to put into writing against the next meeting.

He acquainted the Society with an observation, that he had formerly made about the motion of the superficies of undulating water, which he had taken notice of by the motion of a cork floating in it; and said, that the cork did not keep exactly rising in a perpendicular line, but had also a lateral motion, the composition of which two motions together made the cork move in an ellipsis.

He remarked, that ESCHINARDUS had demonstrated, that the best figure for a specular burning glass was a spherical concave, which was much better than a parabolical concave.

He

He also gave an account of ESCHINARDUS's way of graduating and adjusting thermometers; as Mr. Hooke likewise did of the method of adjusting thermometers by a standard, according to which all that were made by Mr. RICHARD SHORTGRAVE were adjusted; a short account of which Mr. Hooke had formerly published in his *Micrographia*.

Part of a letter of Dr. PAPIN to Dr. CROUNE dated at Antwerp 1 March 1677, N. S.\* was read, wherein he mentioned his having, before his departure from London, left at Mr. Hooke's lodgings his engine for softening of bones, &c. to be presented to the Society; and his desire and readiness to serve the Society in the places, where he should reside.

An experiment was made in Dr. PAPIN's engine, wherein were put pieces of ivory, horn, and tortoise-shell; all which were in about the space of half an hour reduced to softness; the tortoise-shell to the softness and pliability of shoe-leather or tanned leather, the ivory to the consistence of old Cheddar cheese, and the horn to the softness and pliability of pretty stiff tanned leather.

March 9, Dr. HOLDER in the chair.

The minutes of the preceding meeting were read.

Sir JOHN HOSKYNs's account in writing of the *Prattica minerale* was read.

Hereupon were occasioned several discourses about authors, who had written concerning mines; and particularly LAZARUS ERKAR, who was said to be very much esteemed for his knowledge and discourse on that subject; but whose book being in high Dutch was understood by few in England. It was therefore moved, that some endeavours should be used to get it translated into English. Mr. HENSHAW said, that he had the book by him, and that he would lend it to any person, who should be willing to translate it. Upon which Mr. Hooke was desired to peruse it, and to give what assistance he could in the translation, which he promised to do.

Dr. ALLEN proposed, that a trial might be made with Dr. PAPIN's engine, whether coral and talc boiled well in it would be reduced to a softness; which was accordingly ordered to be done.

Mr. Hooke delivered in a German book, which he had received from Mr. HENSHAW, being an account of the appearances of the comet before and after its conjunction with the sun. This was sent by Sir PETER WYCHE from Hamburg as a present to the Society. It was desired, that some account of this book might be given in to the Society.

Dr. GALE presented two letters to himself, one from professor STURMIUS dated at Altorf 10 Febr. 1677,\* concerning the observatory to be set at Nuremberg;

\* Letter book vol. 8. p. 156.

\* Ibid. p. 155.

which

which was read : The other from Mr. HEVELIUS, dated at Dantzick 17 January 1677 N. S.<sup>p</sup> concerning a comet, and the occultation of Palilicium or Bull's Eye by the moon, was referred to the next meeting.

The experiments made with Dr. PAPIN's boiling engine were in order to examine the power of it in softening beef-bones and wood : But though the fire was urged so long till a drop of water would evaporate in three seconds of time ; yet upon suffering the engine to cool, and then opening it, and examining the substance, it was found, that neither the wood nor bones were considerably altered in their hardness.

*March 16*, the President in the chair.

The minutes of March 9 were read, and several parts of them discoursed of.

Mr. JOHN ROGERS, chaplain to the earl of Berkley, was proposed candidate by Dr. HOLDER.

Mr. HOOKE presented from ROBERT WOOD, LL.D. one of his almanacks put into a gilt frame for the use of the Society, and another to the president.

Upon discoursing concerning the translation of LAZARUS ERKER into English, Dr. HOLDER remarked, that this was actually done by Sir JOHN PETTUS ; but that his translation was not printed, because the booksellers were unwilling to undertake it. It was therefore thought, that the best expedient to have it published would be to print it at the translator's charge, and to procure subscriptions for the taking off a considerable number of copies. Dr. HOLDER was desired to get from Sir JOHN PETTUS, then in the Fleet, a sight of the said translation, and to discourse with him concerning this expedient for publishing it ; and to acquaint the Society with the result of it.

Dr. PELL mentioned, that he had translated the greatest part of ERKER's book into English, but had not completed it, finding great difficulty to understand the mineral terms of art. And that for the doing that work, as it ought to be done, great care and skill were requisite, because that in such trials the greatest nicety is often very necessary, since the omitting or varying of some little, and perhaps not otherwise observable, circumstance frequently made desired effects to be produced or not produced ; which was sufficiently known to such, as had made experiments in chemical matters. He instanced in the way of making verdigrise of the husks of grapes pressed and bits of copper, affirming, that the bits of copper being mixed with the said husks dry would be turned to verdigrise ; but if mixed with the husks wet would produce none at all. This was confirmed by the opinion of Mr. BOYLE in one of his books.

Mr. HOUGHTON proposed, that it might be tried, whether there could not in England be found out the way of making jessamine gloves by the help of the

<sup>p</sup> Letter-Book, Vol. viii. p. 151.

white narcissus flowers, or daffodils; for that he had been informed, that such a thing had been done.

The president mentioned, that he had known oil of jessamine made in England with jessamine flowers by packing up the gloves first oiled with oil of ben or of almonds, and mixing a layer of jessamine flowers.

He acquainted the Society, that Mr. MERCATOR had lately shewn the king a new way or projection of maps useful for seamen; but did not mention the particular method of it.

Mr. HOOKE said, that Mr. MERCATOR had been with him to discover to him his projection; but that he was not willing to understand it from him, in order that when his own, which he already discovered to the president, should come out, it might not be thought, that he had taken any part of Mr. MERCATOR's invention.

Mr. HOOKE produced a paper, which he had procured from Mr. CLUVERUS, who had taken the pains to peruse JOHN HENDRICHT VOIGT's book called, *Cometa matutinus et vespertinus*, and had made an extract of the same; which was read.

This gave occasion to several discourses about the comet.

Mr. HENSHAW's letter to Dr. GALE was read, and the doctor was desired to return an answer to it.

The experiments tried with Dr. PAPIN's engine were with coral, talc, oyster-shells, lobster-shells, and shrimp-shells; none of which, though were urged very long with a strong fire, were any way softened by the operation.

March 23, at a meeting of the COUNCIL were present,

The President in the chair.

Mr. COLWALL

Mr. PERRY

Mr. HILL

Dr. GALE

Mr. ASTON

Mr. HOOKE

Mr. HENSHAW

Upon consideration, that there was a piece of ground at Chelsea-college, lying along the side of the Society's field, to the free enjoyment of which some interruption had been given, and some objections made, as if the tenants had a common right of coming upon that piece of ground to dry their hay; Mr. COLWALL and Mr. HOOKE were desired to discourse with Mr. CHENEY upon that point, and to find, if there were any reasonable cause for this pretence, and to make report to the Council what Mr. CHENEY's sense was of this affair; upon which, farther advice should be taken by the Council, Mr. HENSHAW having informed

formed them, that clay had been dug in the pasture by permission of Mr. CHENEY, Mr. COLWALL and Mr. HOOKE were likewise desired to discourse with Mr. CHENEY upon that point.

Mr. HENSHAW was desired to employ some person in the country to mound the ground before the college with a very sufficient mound and ditch of earth, and a plain gate and post, the charge to be defrayed by the Society; and if he should hear of any tenant, who should offer a reasonable rent from year to year, till the Society should have any better offers for a longer lease, or other use of the ground and building, that he would make a report to the Council.

He was farther desired to speak with the Churchwardens of Chelsea to fill up the pit, in which they had dug gravel, according to law.

Mr. HOOKE and Mr. ASTON were desired to go to Mr. LANE, and give him a fee to peruse all the Society's writings, and to make an orderly abstract, especially of those relating to the title to Chelsea-college and land; and that those writings be then orderly placed, according to the statutes, in the chest, together with the other writings in Mr. HILL's hands concerning the fee-farms; and that Mr. LANE be asked, whether any of the writings be necessary to be inrolled; and that it be accordingly done, if he should advise it.

Mr. HUNT was ordered to make a good and perfect survey and map in vellum of the lands in Chelsea.

The catalogue of the books of the Society being now finished, it was thought necessary to look over all the orders concerning the library, and to register them, in order that a statute might be formed out of them, to be entered in the statute-book: And Mr. PERRY was desired to take Mr. HUNT, and direct and employ him from day to day to assort the books; and Mr. WICKS to write out tables upon card past-boards to be affixed to the outside of the presses.

The question being put, whether a printer should be chosen for the Society, and divers objecting, that it was rather prejudicial than otherwise to the Society, it was carried in the affirmative; but so that the debate might be resumed, if new reason should offer to the contrary. The consideration of the person was deferred to the next Council.

At a meeting of the SOCIETY on the same day, the president in the chair:

The minutes of March 18 were read, and upon discoursing concerning mines, it was affirmed, that the laws of the miners in Derbyshire were printed long before by one Mr. THOMAS JOHNSON, who was now a clerk of the New River Company; the title of which book is, *The Barmoor Court*.

Upon discoursing farther concerning the jessamine perfume, Mr. HENSHAW observed, that he had the way of making it, which was, that the gloves to be

perfumed were first oiled with oil of ben, that had been first stratified with jessamine flowers three times repeated, and then the gloves were stratified with jessamine flowers.

Mr. HERBERT mentioned, that he had known it done by only stratifying the gloves dry (without oiling them) with the jessamine flowers.

Dr. CROUNE related, that having had a vessel of orange flowers pickled brought over hither, he had distilled them, and found them to yield a great quantity of spirit or oil : And that he had divers times pickled peale-leaves, and afterwards distilled them, and found them to yield very much spirit, and some oil.

Mr. HOUGHTON related, that Mons. CHARRAS's way of extracting the essence from jessamine flowers was to lay the flowers on a flannel blanket oiled with oil of ben.

Dr. CROUNE said, that the same way was in the *Pharmacopœia Augustana* of Zwelfer ; but that some, instead of a blanket, made use of cotton oiled as before.

Mr. HENSHAW moved, that it might be urged, whether the scent of the honey-suckle might not be extracted the same way, and that of several other curious-smelling flowers.

The president observed, that honey-suckles, violets, and several other fragrant flowers lose that fragrance, if any ways bruised.

On discoursing about the lasting and strength of some scents, Dr. CROUNE affirmed, that having made use of the point of a knife for taking some civet, which was very good, out of a box, he found the knife to retain that smell above ten years after, though he had made much use of the knife, and had often whetted it.

The president observed, that the Chinese were so skillful in perfuming, that he had found a China cabinet to have in every drawer of it a distinct perfume, which he conceived to be mingled or incorporated with the hard varnish, since it was varnished both within and without.

Dr. CROUNE was of opinion, that they were all made out of one gum by mixture of some other substance with it. But Mr. HENSHAW supposed, that they might be rather made by the natural smell of several sorts of wood, for that those countries afford great varieties of sweet-smelling woods.

SIR CHRISTOPHER WREN now somewhat explained Mr. MERCATOR's new projection for maps for the use of the seamen, *viz.* that it was a certain projection of the surface of the globe upon a plain parallel to the plane of the æquator : That the pole was the centre ; and the parallels concentric circles ; the meridians straight lines passing through the pole or centre ; all which are common with several

veral other polar projections already known and used : But the singularity of this was, that the distances of the parallel circles were proportioned according to the proper spreading of the meridians somewhat of the nature of the chart of Mr. WRIGHT (commonly, but falsely, called MERCATOR's chart) to which he had a certain scale appropriated so, as that he could easily measure distances.

Sir ROBERT SOUTHWELL's present, delivered in at the last meeting by Mr. HOOKE, of a quantity of Dr. KUNKELL's phosphorus (the receipt of which Sir ROBERT had communicated to the Society some time before) was now examined, a glass having been prepared for it, according to the order of the last meeting; and by many trials this phosphorus was found to be much the same with that which KRAFT had some years before shewed to Mr. BOYLE and several other persons. But it was remarkable, that it wanted some small quantity of fresh air to make it shine; and besides, that shaking and heat were very conducive to that effect; that it emitted a perfect flame and a kind of smoke, but had no manner of sensible heat.

An experiment was tried in Dr. PAPIN's engine with barley covered with water, which after above an hour's boiling was reduced to a very thick pulp, it having very much opened and loosened the body of it, so that the tincture or strength of it might be extracted in water.

1681. *March 30*, the president and vice president being absent, Mr. HENSHAW was desired to take the chair.

The minutes of the preceding meeting being read, several matters were discussed concerning the sorts of perfumes, and the way of making, compounding, and using them : And Mr. EVELYN and Mr. HENSHAW both said, that they had all Sir RALPH HOPTON's receipts for making and using of great variety of very excellent perfumes.

Mr. EVELYN farther affirmed, that the present duke of Norfolk had a very large collection of receipts of that kind.

Mr. HENSHAW related, that the way of making jessamine oil was to slit almonds or ben nuts, and then to stratify them three times with fresh jessamine flowers; whereby the oil of the nut would be highly impregnated with the scent of the flowers, and afterwards pressing out this oil, therewith to rub the gloves to be perfumed; and then to stratify them with fresh jessamine flowers, which will increase the smell.

Mr. EVELYN said, that the same might be done by cotton dipt in the oil of ben, and laid within sieves, such as the apothecaries use for their powders, the cotton being laid upon one hair-cloth, and the flowers on another, and the whole included from the air by the two outermost leathern sieves.

With regard to the offence, which perfumes give to some women, Mr. HENSHAW

SHAW was of opinion, that there was somewhat peculiar in the air of England in that respect ; for that it is observed, that ladies in Spain and Italy use the highest perfumes without the least offence ; whereas the contrary is very remarkable here. And he added, that he knew a lady, who, when she first came to England, used the highest perfumes with great delight, and wondered with some disdain at the nature of English women, who suffered much prejudice by them : But having lived here some time, she began to hate them as much as she had valued them before, as well for the smell itself as for the effects

Dr. KING relates from his own experience, that rose leaves beaten to a conserve, and then dried in an oven, would preserve the scent all the year.

For preserving them also, they are usually beaten with salt like a conserve, and so kept all the year in a China or other earthen pot or jar, which being at any time stired with the finger would perfume a room.

Mr. HENSHAW related a way of immediately making hippocras, by mixing double-refined sugar with one part of good canary and two of white wine ; and then dropping in some drops of spirit of wine highly impregnated with spices.

He also affirmed, that the highest essence of roses and some other flowers was made by highly impregnating rectified spirit of wine with the dried leaves of those flowers.

The way of making oil of cinnamon and oil of rhodium was related to be \* \* \*.

After the discourse was ended, the experiment was tried for finding the resistance of the air to bodies moved through it ; and how much longer a body would continue its motion in an evacuated vessel than in one filled with air.

To this purpose a pendulum was hung or fitted into a large receiver or vessel of glass, so as by moving the glass it might be put into motion. Then the air was very well exhausted out of it by the air-pump, and kept out by a stop-cock : Then the comparison was made by the keeping account how long the same pendulum continued its motion in the vessel, when exhausted, and how long in the same vessel, when filled with air.

*April 6,* the Society did not meet.

*April 13,* at a meeting of the COUNCIL, were present,

The President,

Sir JOHN LOWTHER	Mr. HENSHAW
Sir CYRIL WYCHE	Mr. HILL
Sir THEODORE DE VAUX	Mr. ASTON
Mr. CREED	Mr. HOOKE.
Mr. PERRY	

\* This minute was left unfinished in the journal, Vol. vii. p. 9.

MR. HILL reporting, that he had an acquaintance of his, who was a friend of Mr. GREEN, he was desired to speak with his acquaintance to treat with Mr. GREEN about procuring part of the meadow ground lying between Chelsea-college and the Thames, and to report his proceedings to the next meeting of the Council.

It was resolved, that the president, Sir JOHN LOWTHER, Mr. COLWALL, Mr. HENSHAW and Mr. HILL, discourse with Mr. CHENEY about the Society's acre of ground, lying next the meadows on the Thames, the possession of which had given the Society some disturbance.

It was ordered, that the small charter-books of the Society's statutes and charters be carried to Mr. LANE; as also the two following queries;

1. Whether the Society may demolish any part of the building at Chelsea now standing?

2. Whether the Society may sell, dispose, or any ways alienate any part of the said materials?

It was ordered, that Mr. WICKS do make a copy of all the orders, that had been made concerning the library, to be delivered at the next meeting of the Council.

MR. PERRY presented the council with three printed catalogues of the library of the Society\*; for which, and his care and great pains in composing the same, he had the thanks of the council.

DR. GALE was desired to speak to Sir WILLIAM DUGDALE, in order to procure the copy of dooms-day book now in the Herald's-office.

Upon resuming the debate, whether a printer should be chosen for the Society, it was resolved in the affirmative; and Mr. RICHARD CHISWELL was unanimously chosen.

It was ordered, that Mr. CHISWELL's charter be made by Mr. WICKS against the next meeting: And

That some catalogues of the library, well bound at the charge of the Society, be presented as follows;

To the Duke of NORFOLK,  
The Earl of ARUNDEL,

\* This catalogue was printed at London in 1710. under the following title: *Bibliotheca Naturalis; sive, Catalogus libb. manscriptorum et impressorum in omni arte et lingua, quæ illustri*

*principi, Henrico Duci Norfolkæ, &c. Regis Societatis Londinensii pro scientiâ naturali promovendâ donavit.*

The

- The Lord THOMAS HOWARD,  
Mr. CHARLES HOWARD,  
Mr. EDWARD HOWARD.

The said five books to be left with Sir THEODORE DE VAUX.

At a meeting of the SOCIETY, on the same day, the president in the chair :

The minutes of the last meeting were read.

Several debates arose about the use and abuse of snuff-powder, and several instances mentioned of the bewitching custom of taking snuff, tobacco, &c.

Dr. HOLDER related, that having kept some rose leaves so long till they were eaten up by the insects, he found in the vessel a great quantity of the excrements of those insects, which having kept in a box, he found them to give a better and stronger smell of the rose than the leaves themselves did.

Mr. HENSHAW delivered in some observations on the comet made at Boston in New England, sent to him from Mr. BRAITHWAYTE ; which were read.

Sir THEODORE DE VAUX presented to the Society, for their library, the works of GALILEO, printed in Italian, and finely bound in three volumes.

Mr. HOUGHTON presented a large piece of crystal fairly cut, being an exact model of the grand duke of Tuscany's diamond ; which model was presented by the grand duke himself to Dr. DU MOULIN. Mr. HOUGHTON had procured this of Mr. SMITH, the writing-master of Christ's Hospital.

There being a very full meeting, the Society proceeded to the election of the several candidates, who had been formerly proposed ; and the following were elected members ;

ROBERT WOOD, LL.D. master of the mathematical school founded by the king in Christ's Hospital.  
Sir ANTHONY DEANE, Knt.  
HUGH CHAMBERLAYNE, M.D.  
Sir JOHN PERCIVAL, Bart.  
ROGER MEREDITH, M. A. professor of the civil law in Gresham College.  
Mr. ROGERS.  
Mr. SALISBURY.  
Dr. RUSSELL.

Mr. JODOCUS CRULL was proposed candidate by Dr. HOLDER ; and JEREMY SAMBROOKE, Esq; by Mr. HOUGHTON.

*April 20, Mr. HENSHAW in the chair :*

The minutes of the last meeting were read and discoursed of.

RICHARD WALLER, Esq; was proposed candidate by Dr. CROUNE.\*

Mr. HOOKE read a long discourse about the nature of light and luminous bodies<sup>†</sup>.

Mr. AUBREY presented for the repository a piece of iron ore, of which he promised to give an account in writing.

He produced a letter of Mr. JOHN ROGERS, dated at Chippenham March 14, 1677, containing the following passage:

“ The prodigious fog in the Temple was between three and four of the clock in the afternoon the 27th of November 1674; and the extreme hot time in London was from the 10th of June to the 19th, 1676. These things for my own curiosity I entered in my book.”

The experiment of fire burning in a box was exhibited and explained; and it was shewn how it was pertinent for the explanation of the theory of light in the abovementioned discourse of Mr. HOOKE.

April 27, at a meeting of the COUNCIL were present,

THE PRESIDENT  
Sir JOHN HOSKYNs  
Sir JOHN LAURENCE  
Mr. HILL  
Mr. COLWALL

Dr. KING  
Mr. ASTON  
Mr. PERRY  
Mr. HOOKE.

Mr. HILL communicated a letter of a friend of his, who was desired to discourse Mr. GREEN, to find, if he would part with his meadow between Chelsea-college and the Thames; and from the letter it appeared, that he set it at 600 l. being ten acres. It was thought convenient, that the president should try whether Mr. GREEN would part with half an acre, so much as would be necessary to make a way; and the rather, because there appeared designs of other persons, which would turn to the prejudice of the college.

Sir JOHN HOSKYNs was added to the committee appointed to discourse with Mr. CHENEY concerning the way by the meadows, Mr. CHENEY having offered, that at the next meeting he would give the council fuller satisfaction in what he asserted, that the said way did not belong to the Society.

Sir JOHN HOSKYNs was desired to peruse the statute relating to the printer of the Society, and to draw up another patent for Mr. CHISWELL, in which the

\* See his life by Mr. WALLER, p. 23. and his *Posthumous Works*, p. 71. & seq.

powers given the printer may be less disadvantageous to the Society, than (as by experience had been found) the patent given formerly to MARTYN and ALLESTREE appeared to be; a copy of which patent Mr. WICKS was directed to carry to Sir JOHN HOSKYNs.

A proposition being made by one Mr. THOMAS HUTTON to become tenant for Chelsea-college, in order to erect there a manufacture of paper, it was referred to a committee consisting of the president, Sir JOHN HOSKYNs, Mr. HILL, and Mr. HOOKE, to meet that evening.

Sir JOHN HOSKYNs was added to the committee appointed 23 March, to discourse Mr. LANE about the writings of the Society, and to inquire of him or any learned in the law concerning the right of copies, upon Dr. GALE's mentioning, that Mr. CHISWELL would reprint the *History of the Royal Society*, and other works, if he knew where the title to them were.

Dr. GALE having informed the council, that there was an excellent library in the kind, which was one Mr. SMITH's; and which he believed the widow would be willing to deposit with the Society, or at least upon very easy terms; Dr. GALE was desired to proceed in his inquiry, according to his direction, and to make a farther report.

Dr. GALE having mentioned, that the Earl of BERKLEY's books were probably not yet disposed of; he was desired to inquire farther, and acquaint the president.

The president desired Mr. HILL to give in a paper concerning the state of the income of the Society; how the salaries were disposed; and what the other expences had been of late years; and also a medium of the payments, how much they had amounted to yearly for the last five or seven years, in order the better to state and proportion the expences.

At a meeting of the SOCIETY on the same day, the president in the chair.

The minutes of April 20th were read: whereupon the president related, that he had several times observed, that prawns would shine in the dark, whilst they were yet fresh and new, and before they began to decay and taint.

Mr. HOOKE read another discourse concerning the nature, cause, and effect of light and luminous bodies, wherein was an enumeration of all such bodies, as afford light, and the manner how they might be made luminous\*.

The experiments of two pendulums, the one inclosed in a long glass body, out of which the air was exhausted; and the other in just such another glass body with

\* Mr. RICHARD SMITH, formerly secondary of the Poultry Compter, who died at London 26 March, 1675. His library was sold by

auction in May and June 1682.

\* See his *Philosophical Works*, p. 71. &c.

the air included, were tried; and it was observed, that though the motion of the pendulum in the exhausted receiver continued very much longer, and so larger than that of the pendulum in the receiver unexhausted; yet the motion of the pendulum therein also did by degrees decay, and was at last wholly lost; so that though the air seemed to be the only body, that would stop the motion of the pendulum moving freely in it, yet there was a necessity of supposing some other body to be contained in the receiver exhausted of air; which must produce that effect; unless it should be supposed, that motion without any impediment would cease and be lost.

Dr. GALE read an account in Latin of Mr. BURNET's book, intitled *Telluris theoria sacra*, which was discoursed of and well approved of as to some particulars of the theory, though the proof and management thereof could not be judged of without a perusal of the discourse itself.

It was desired, that the experiments for the next meeting might be about the explication of light.

Mr. WALLER, Mr. SAMBROOKE, Mr. BRADDOW, Mr. GOODWIN and Dr. JORDIS were elected fellows.

May 4, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN president,

Sir JOHN LOWTHER

Mr. ASTON

Dr. KING

Mr. HOOKE.

Mr. HILL

Mr. HILL reported from the dean of Canterbury\*, that the books, which, it was hoped, might have been obtained from the Lord BERKLEY†, were certainly disposed of, and legally settled; and of that he had spoken to his lordship, who seemed sorry, that he had not been sooner put in mind of it, before he had been engaged.

Mr. HILL brought in an account in general of the income and charges of the Society for some late years, as he had been desired, in order that the council might consider of new modelling the affairs and expences of the Society. After several discourses the debate was adjourned till the next meeting of the council, and the president was desired to bring in some propositions in writing.

Mr. HUNT was ordered without farther delay to survey the land at Chelsea-college (as he had been before ordered on the 23d of November 1680) to the end, that the tenants might have their leases sealed accordingly: and Sir JOHN HOSKYNs, Mr.

\* Dr. TILLOTSON.

† GEORGE Earl of Berkley, who in 1682 gave to the library of the clergy of London in Lion college a very valuable one left to his lord-

ship's disposal by the will of Sir ROBERT COOKE, who had collected it. See Mr. READING's State of Lion library, p. 36.

HENSHAW, and Mr. HOOKE were appointed a committee to cause draughts to be made of the lease to THOMAS FRANKLYN of the arable and meadow, according as Mr. HENSHAW had formerly treated with him, viz. in November preceding; and they were desired to express truly the names and boundaries, according to the original papers of the Society, in which (after the survey made) they were requested to inspect the words of the grant and other papers necessary. And the said committee were to have copies of this order, and make their report thereupon at the next meeting of the Council.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN president in the chair.

The president gave leave to Mr. GREGORY, a nephew of Mr. GREGORY the professor of mathematics at Glasgow, to be present at this meeting.

Mr. MERIDITH and Mr. RICHARD WALLER subscribed the obligation, and were admitted fellows.

Mr. JOHN ADAMS presented his proposals for making an actual survey of England by measuring the bounding line, the distances between places both in the road and the strait lines, by taking the latitudes and angles of position; desiring the directions and encouragement of the Society in this undertaking.

It was referred to Sir JOHN HOSKYNES, Dr. PELL, Mr. HILL, and Mr. HOOKE, to consider of the said proposals against the next meeting.

Mr. HOOKE read another discourse about his theory of light.

The experiment about the motion of the pendulum *in vacuo* and in the common air was discoursed of; and it was queried, what should be the cause of the stay of the motion of the pendulum *in vacuo*, since there was no sensible body to hinder its free motion. It was supposed by some to be the weight of the string, as had been also supposed by GALILEO; by some to be the bending of the string.

Mr. HOOKE supposed it to be from a body of a middle nature between æther and air, the motion, gravitation, and density of which he conceived also to be the cause of divers of the phenomena, which he should have occasion to discourse more of in his farther inquiries about light.

This, he affirmed, would be likewise useful in the explication of the motions of the celestial bodies, as the moon and other planets.

Mr. HOOKE explained and demonstrated a certain property in the projection of the planisphere not taken notice of by any writer; which was to shew the proportion between the substances of the arches of great circles in the globe and those lines projected in the planisphere to be the same; and how by that means the distances of any two places in a map so projected on the pole of the world,

or the distance between any two stars in a projection of the heavens, either on the pole of the equinoctial or ecliptic, might be certainly measured by the help of a line of chords on a sector, which he supposed would do all that was pretended to be done by a new projection of Mr. MERCATOR, of which, he said, Mr. MERCATOR had not yet discovered the ground nor the demonstration, but alledged it to be upon another principle.

The president was satisfied with the explanation and demonstration of Mr. HOOKE; and desired, that he would bring in his demonstration in writing; as also his method of solving by it all spherical triangles, more easily than by the common ways.

Mr. PERRY presented a small bottle of natural balsam or balm of Gilead, the least drop of which being poured upon water, he affirmed, would immediately spread itself, and cover the whole surface of the water.

May 18, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN president,
Sir JOHN HOSKYNs	Mr. ASTON
Mr. HILL	Mr. PERRY
Mr. COLWALL.	Mr. HOOKE.

It was ordered, that seven pair of presses more be made to fill up the south side of the library; and Mr. PERRY was desired to contrive (which, it was computed, might be done) that the whole Arundel library may be contained in that side, and Mr. ENT's books be placed between the windows, in order to commence the library of philosophical books on the window side:

That Mr. HUNT provide a stamp, according to direction, for the new books, and such as are ordered to be bound:

That Mr. HILL, Mr. ASTON, and Mr. PERRY be a committee to inquire what books are lent abroad, and to send for them and dispose them in the library; and Mr. PERRY to add them to the catalogue:

That obligations be printed and bound together in a book, one sort with the penalty of ten pounds for printed books; another sort of fifty pounds for manuscripts; which obligations were to remain in the librarian's hands, and to be signed and sealed by the borrower, and cancelled, by the librarian, when the book shall be returned: and

That Sir JOHN HOSKYNs, Sir JOHN LOWTHER, Mr. HENSHAW, Mr. HILL, Dr. KING and Mr. HOOKE be a committee to meet on Friday afternoon at half an hour after three, to go to Chelsea, and discourse the neighbourhood there in relation to the Society's interest in the public way.

Mr.

Mr. HUNT brought in the map of the land belonging to Chelsea-college, which he was ordered to keep with the charter and other writings of the Society: and to attend the committee at Chelsea on the Friday following with the said map.

It was ordered, that Mr. LANE be added to the committee appointed May 4, for sealing the writings; and Mr. HOOKE was desired to procure a meeting of Mr. LANE with Sir JOHN HOSKYNs immediately.

Dr. CROUNE reported, that Mr. ROSSINGTON had no farther design of taking Chelsea-college.

Mr. HENSHAW mentioned, that Mr. CLERKE near the Bowling-Alley in Chelsea was willing to become tenant for the college to the Society, and to give twenty pounds *per annum*, if the Society should not agree with Mr. HUTTON.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN president in the chair:

The minutes of the preceding meeting were read.

Mr. HOOKE acquainted the Society, that on the Saturday before he had met Mr. MERCATOR at Mr. BERRY's, where, after Mr. HOOKE had told him, that he had demonstrated the property of the planispherical projection for measuring distances of places in different longitudes and latitudes by the help of a line of chords on a sector, who would serve indifferently for all magnitudes of that projection; and had also shewn him the manner of measuring thereby, which Mr. MERCATOR desired to see a second time; the latter very often and very positively affirmed, that his projection was not like that, but of another nature, and was no optical projection, but done by a certain proportion, which he had found, of dividing the meridian line, somewhat of the nature of Mr. WRIGHT's or MERCATOR's projection, as it was called, for the finding the rhomb and distance: that his projection was finite, and did not extend by the proportion of the half tangent, but was finished with a circle not very far extended, which represented the south pole: with many other expressions of the like nature, by which he wholly disclaimed this projection. But that on the Monday after Mr. MERCATOR came to Mr. HOOKE's lodgings with Mr. AUBREY, where he positively said, that his projection was no other than that of the common planisphere; and that though he had made use of another way of measuring, yet he understood the way of using the sector. To which Mr. HOOKE answered, that though he was sufficiently assured of Mr. MERCATOR's ability, yet it did not evidently appear to him, that he, Mr. MERCATOR, had known either that property of the planisphere or the use of the sector in that particular, before he, Mr. HOOKE, had demonstrated it; or that the projection, which he had shewn the king, was the same with the planisphere, since he had informed Sir CHRISTOPHER WREN as well as many others, that it was not that, nor any optical projection.

Mr.

Mr. HOOKE dissuaded Mr. MERCATOR from taking out a patent for the said invention; since, as it could not restrain any person from making maps in that way, it having been so old, common, and practised a way of making maps; so, though it could, yet he assured Mr. MERCATOR, that he himself was making maps by another way, the properties of which far exceeded those of the planisphere; for which nevertheless he would not take the benefit of a patent, but desired, that the use and benefit thereof might be free.

A discourse was occasioned about the pendulums standing still in an artificial vacuum: whereupon some conceived, that it was occasioned by the bending of the string; others from the weight of the string or wire: but Mr. HOOKE answered those objections, and demonstrated, that it could not be either the bending of the string, or the weight of any part thereof, that must cause that impediment. And upon that occasion he acquainted the Society with a way of hanging a pendulum by a very broad and thick spring, which he had many years since invented and explained in one of his lectures in the year 1666. That he had since made divers clocks that way: and that he had acquainted Mr. TOMPION with it, who had also several times used it.

Mr. ADAMS was again present about his proposals, with a design to shew the small quadrant, that he had made for making short distances with perspective sights: But the instrument-maker not coming till after the Society was risen, it was shewn to but some few members, who stayed in Dr. POPE's lodgings.

He declared, that he had made trial by setting up four lights at Greenwich, each eight inches asunder, which were not to be distinguished at London one from another: but the four lights set up at London ten inches distance from another were distinguished at Greenwich by the sights of his quadrant of fifty inches radius.

Mr. HOOKE read a translation, which he had made of a paper of Sir THEODORE MAVERNE, brought in by Sir THEODORE DE VAUX, about a method of staining agates. Sir THEODORE DE VAUX was desired to communicate some others of his collections of Sir THEODORE MAVERNE's papers: which he promised to do.

Some experiments were tried in Dr. PAPIN's engine for dissolving of several gums by heat and pressure; and it was found, that the engine very much promoted the dissolution, both of watry and oily gums. The trials were made with gum Arabic, gum tragacanth, gum sanderic, and gum mastic. The former two were dissolved in water; the latter two in spirit of wine.

May 25, Sir. JOHN HOSKYNs in the chair.

The minutes of the preceding meeting were read; which gave occasion to discourse about the ways of staining agate mentioned in Sir THEODORE MAVERNE's paper communicated by Sir THEODORE DE VAUX: and it was generally concluded

cluded, that the ways mentioned in that paper were only conjectures, and not the result of experiments; and that there were other ways of opening the bodies of stones, so as that they might imbibe colours, than by means of spirit of nitre, which would rather corrode a stone than sink into it. Thereupon Mr. Hooke related, that he had been lately informed, that a goldsmith in Lombard-street had an agate by him, that had been so stained.

Dr. PLOT related, that one Mr. BIRD, a mason of Oxford, had very much perfected the invention of staining, being able, as was alledged, to stain in the colours very defined, without running or spreading; but that he could not yet find out a way of staining a perfect black.

Mr. AUBREY remarked, that Sir CHRISTOPHER WREN had shewed him a foot-pace of white marble, which by the fall of the drops from a tallow-candle was stained black.

It was by several affirmed, that there were some English flints, which, when polished, would be as beautiful as East-India stones: that Sir ANTHONY COPE had some such stones, which he took up at Bishop-stortford, which being cut and polished seemed in their beauty, hardness, and polish even to exceed the India stones.

Mr. HENSHAW mentioned the stones of the same nature, which he had formerly brought from St. Alban's, and which were of as great hardness and beauty as those of Sir ANTHONY COPE, and were to be had of any desirable size.

Dr. PLOT shewed a flint, which had been found in an urn in Staffordshire, the edges and sides of which seemed to be cut by art as with a chissel, and the edge to be crenated like that of the side of a sickle; which were supposed to be done by art, though which way none could conjecture, any more than they could the use of it, or why it should be put in the urn. But some conjectured, that it might be the head of a dart, there having been arrows of that kind seen by some members of the Society; and that the reason of its being found in the urn was, that it might be buried with the ashes of the person deceased, either as his weapon of war, or as a piece of his own art, or as a trophy.

Two experiments were tried in Dr. PAPIN's boiling engine, viz. to see how well and how soon gum lac and gum animi would be dissolved in spirit of wine by the help of heat and pressure.

June 1, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN president

Sir JOHN HOSKYNs

Mr. PERRY

Mr. HILL

Mr. HOOKE.

Mr. ASTON

The

The president reported his view and observations made at Chelsea college on the Friday preceding: upon debating of which Mr. HUNT was directed to go thither this evening to speak with Mr. BROMAGE, and to Mr. FRANKLYN, to desire his father to be present with the jury, when they take a view of the ship of ground in controversy between the Society and the Lord CHENEY; and to bring back an account of his proceedings therein; and to take the president's directions what to do farther in that affair.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs, vice-president, in the chair:

The minutes of the last meeting were read and discoursed of.

JEREMY SAMBROOKE, Esq; was admitted.

Mr. HOOKE communicated a letter to himself from Mr. EDMUND HALLEY, dated at Saumur, 19 May 1681; containing some articles of literary intelligence, and particularly an account of the books published by the Royal Academy of Sciences, with a short account of Monf. CASSINI's hypothesis of the comet: upon which Mr. HOOKE shewed Monf. CASSINI's book on that comet.

Mr. HOOKE was desired, when he should write next to Mr. HALLEY, to inquire what was become of the works of Monf. MYDORGE,\* which were not printed.

Mr. AUBREY mentioned, that Mr. PASCHAL had informed him, that a comet had been seen in the west the week before; and other members remarked, that in the Scots Gazette there was also mention made of a comet lately seen.

Mr. SAMBROOKE observed, that there had been seen a very considerable comet in the East-Indies in the year 1667, of which he had the observations made by a Padre, which he promised to shew the Society.

A letter in Latin to Dr. CROUNE from CAROLUS A JESU, *præpositus generalis clericorum regularium matris Dei scholarum pauperum*†, and one of the executors of Signor BORELLI, was read; in which he desired to be informed, what number of the first part of BORELLI's book *De motu animalium*, printed at Rome, might be disposed of in England, that so he might take care to send them; desiring only, that returns should be made to him in some of the books published in England.

Mr. CHISWELL was ordered to be spoken with on this affair.

Mr. HOOKE shewed a collection of observations of the comet made at Nurem-

† CLAUDE MYDORGE, born in 1585, at first counsellor in the châtelet at Paris, and afterwards treasurer of France in the generality of Amiens.

He died in 1647. Baillet, *Vie de Des Cartes*, Tom. I. p. 36. & Tom. p. 325.

\* Letter-book, Vol. viii. p. 159.

berg, written by Dr. EIMMERT to Dr. ARNOLDUS, who communicated them to the Society ; but there was not time enough to peruse them.

Mr. HOOKE shewed also a draught of a mural quadrant made use of at Nuremberg.

June 8, Sir JOHN HOSKYNs, vice-president, in the chair :

The minutes of the preceding meeting were read.

Sir JOHN HOSKYNs shewed a specimen of the printed sheets and copper-cuts of a small herbal, then printed by Dr. NEWTON ; and gave some account of the work designed to be published by the doctor.

Dr. GALE delivered in to the Society the copy of Domes-day book, which he had received from the heralds, being the gift of the Duke of Norfolk to the Society ; which was delivered to the library-keeper to be registered, and safely kept in the library.

Mr. HOOKE gave a full account of Mons. CASSINI's book concerning the late comets, together with some animadversions on that astronomer's theories for explaining the motions of them.

Dr. TYSON presented the Society with a copy of the translation of Dr. SWAMMERDAM's book of the life of the ephemeron made by Mr. FRANCIS LODWICK.

Mr. HOUGHTON likewise presented the Society with a small treatise of his, intitled, *England's great bappiness*.

Mr. HOOKE shewed a draught sent by Mr. SAMBROOKE of a comet, which was said to be seen in the East-Indies in the year 1667, but not seen here, being far removed to the south.

Mr. HOOKE explained a theory of his about light, and the manner how the eye becomes the organ of sight, and seems immediately to feel the action of the luminous body, though ever so far distant, as if actually on the bottom of the eye.

June 22, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN, president,
Sir JOHN HOSKYNs	Mr. HOOKE
Mr. COLWALL	Mr. PERRY
Mr. HILL	Dr. CROUNE.

The

The president gave an account of his discourse with the Lord CHENEY concerning the strip of Chelsea-college ground lying next to the meadows, claimed by his lordship: and it was thereupon concluded by the council, that it would be the best expedient in this affair forthwith to inclose the college-lands on the south-side next the meadows.

Dr. CROUNE acquainted the council, that Mr. ROSSINGTON was ready to treat with the Society for Chelsea-college, and the ground lying about it, provided he might be secured a convenient passage: Whereupon the president informed the council, that there was a small piece of ground, ~~that~~ lay convenient for that purpose, which was now to be sold. It was ordered therefore, that the president and Sir JOHN HOSKYNs should be desired to take care to purchase it, and to treat and agree with Mr. ROSSINGTON about the college.

It was ordered, that all orders made by the president during his presidentship should continue till Christmas following St. Andrew's day.

In consideration of the propositions made by Mr. HOOKE for a more sedulous prosecution of the experiments for the service of the Society, and particularly the drawing up into treatises several excellent things, which he had formerly promised the world; the council as an encouragement, according to the small abilities of the Society, agreed to add to his salary forty pounds for this year ending at Christmas-day.

June 29, at a meeting of the COUNCIL, were present,

	Sir CHRISTOPHER WREN, president,
Sir JOHN LOWTHER	Mr. PERRY
Mr. HILL	Mr. HOOKE.
Mr. COLWALL	

The patent to Mr. CHISWELL to be printer to the Society being fairly engrossed, was read and approved.

The president gave an account of his discourse with Mr. ROSSINGTON concerning Chelsea-college, whom he found unwilling to comply with the propositions made him by the Society, and to propound only twenty pounds a year for the same. Whereupon it was resolved not to treat farther with him about it, but to think of some other way of disposing of it to some better advantage for the Society.

At the meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN, president, in the chair:

The minutes of the last meeting of June 8th were read, and some heads of them discoursed of.

Mention being made of the great stag's horns lately found in a quarry in Ireland, and presented to the king, the president remarked, that he had seen them, and from their size and shape judged them to be the tire of a moose deer; and the largest that he had seen.

He related, that this animal would in a short time fall into a scouring, and die, for want of eating grafs; and that it was necessary to provide moss for its food: that its neck was so short, that it could not reach its food without kneeling.

He related likewise, that the people near Hudson's Bay live to a great age, as 130 or 140 years, without the use of spectacles; that they generally go well clad in furs, and have a mantle of furs over their shoulders; which being very curiously tanned, so as to be like a piece of cotton, they lie upon it in the night. The oldest, while they are able, run a hunting; and when they can do that no longer, desire to die, and give themselves up to their eldest sons to be strangled. After hunting, if it be winter, they choose themselves a convenient place in the snow, where they take up their quarters that night, which they do by making a pretty deep hole in the snow, and covering it over head with skin, rest thereon very quietly all night: but if it be the time, that the bears range (which they do till the cold forces them to go to sleep) they trail the guts of what they have killed in hunting in the day round their cabbins at a pretty good distance; and having so done, they leave them as a bait to divert the bears from falling on them; for upon scenting the entrails, the bears proceed no farther, but follow the track of the guts till they find and eat them; after which they lose their sense of smelling, and are not sensible of so good a booty so near at hand, but depart satisfied.

These people used to strike fire readily with flint against flint; but have been since furnished by the English with steels, which they use with flints.

They drink in the winter-time snow melted over a fire in a kettle, the bottom of which is made of a kind of fire-stone hollowed with flints like a tray; about the sides of which they fasten tanned skins, so as to make the sides or brims of the skillet.

Dr. Wood remarked, that the Irish had a way of making milk and some other liquids boil in a wooden vessel; which they performed by heating of pebbles almost red hot, and casting them several times into the vessels of milk.

This occasioned a discourse about the beavers of Hudson's Bay, and of their strange sagacity in making dams in rivers, thereby to make lakes for fish, so that the country is very full of such lakes, supposed to be made by these dams: that the beavers send out colonies, when they find they have too many for one lake; who are said to go and find a convenient place in the river, and make a new dam and lake, and plant about it. They in a company will fell great trees, by eating them off at the root; which being felled, they will convey them to the river, and there place them for making a dam.

Mr.

Mr. AUBREY related, that there were many true beavers in Wales.

The president gave a description of and conjecture about the way of raising water in China for watering ground; which it was desired might be farther explained.

Mr. HOUGHTON presented to the Society, for their repository, several things brought from Barbadoes; a yam, prunella, or purging nut, a cotton cod, a rock weed, a ginger root budding forth, an ear of millet, some Cassava bread, and some Guinea pepper. It was affirmed of the cotton cod, that it breaks of itself with a great noise, when it opens.

The president remarked, that it was of late years found, that the blacks, who feed only on potatoes, were apt to die of the dropfy; and that therefore the planters had found it necessary to allow them milk and bread, which prevented it.

Sir JOHN HOSKYNs observed, that it was somewhat like an artichoke.

The president thence observed, that it was necessary, that all wholesome food should have oils: that most roots wanting oil are not of themselves a good nourishment: and that in Ireland, where the people feed much on potatoes, they help themselves by drinking milk soured, to make the potatoes digest the better. This sour milk is called bonny clabbe.

A paper delivered in by Dr. WOOD about the phenomena of a burning glass was read and discoursed of; and the hypothesis thereof was judged to have been formed upon some mistake of the appearances observable in burning with it.

Two letters of Dr. WALLIS were read and discoursed of; the first containing an account of his own observations on the comet seen in December 1680, and January and February 1681; and the latter containing some physical observations\*.

A letter brought in by Mr. HOUGHTON was read, giving an account of the burning of a mountain of peat in \* \*.

Dr. WOOD remarked, that there was in Windsor-forest a place then burning of the like nature.

The president observed, that peat was made by a certain subterraneous plant, which grew and filled and matted up all the place: which might easily be discovered by washing the peat in water, and so clearing away all the sand and earth, which would leave the vegetable matted and felted together.

Dr. SLARE presented to the Society from Mr. NUKE the skeleton of a mouse very curiously done, and promised to shew his skill in making the skeleton of any other larger animal, that should be desired.

\* It is probably the letter to Dr. GALE, in the *transact.* Vol. viii. p. 161, about a dried toad, and the blasting of ash-leaves.

July 6, the Society did not meet; only Signor DAVIA recommended by Signor MALPIGHI was entertained.

July 13, Sir JOHN HOSKYNs, vice-president, in the chair:

Signor DAVIA was present with his friends.

Mr. SALISBURY and Mr. THOMAS PIGGOT were admitted members.

The minutes of June 29 were read, which gave occasion of discoursing farther,

1. Concerning the affinity and agreement between the senses of tasting and smelling: whereupon Mr. COLWALL mentioned the story of JOHN of Liege, who was able to follow a woman by the scent.

2. Concerning the way of tanning leather by the natives of Hudson's Bay, which was extremely supple, and would not grow stiff upon drying it, after it had been wet, as most of our dressed leather is apt to do.

Mr. HOOKE mentioned the way used by the Indians in Virginia for tanning their leather by the help of fire, making use of the brains of the creature mixed with the oil of the hickery and oyster-shell lime.

Mr. HOUGHTON brought in the relation of Sir JOHN NARBOROUGH's voyage through the straits of Magellan to Baldivia; which relation being pretty long, the Society desired, that Mr. HOOKE would peruse it; and that, if it contained any thing very considerable, it might be transcribed.

Mr. MARTIN LISTER being present, shewed the Society a treatise of his, which he was going to print, concerning insects, being observations on GOEDARTIUS's book of insects; together with the figures of the insects therein mentioned, curiously engraven in copper: which book Mr. LISTER desired might be printed with the Society's approbation.

The Society thanked him for the pains, which he had taken on that subject, and encouraged him to proceed with the speedy publication of his book.

Mr. AUBREY related, that he had newly seen a live marten at a shop in Cornhill; adding, that there were many of them bred in England; and that Mr. WYLDE had lately received divers skins of them from a tenant of his in \*\*.

Mr. LISTER said, that he had seen many of them in England, and that they were distinguished from pole-cats, by their climbing of trees in the manner of squirrels.

Sir JOHN HOSKYNs observed, that he had been informed, that there were a sort of wild pole-cats, which had a sweet smell like civet.

Dr.

Dr. SLARE read part of a letter to himself, dated at Francfort in June 1681, from Dr. JORDIS, lately chosen fellow of the Society; and presented also from him five or six small stones shining like marcasites, taken out of the bladder of an ox. The words of the letter were; "Inter illa, quæ Cl. V. communicanda habebam, sunt præfentes lapilli vel pillule, ut videntur, inauratæ, quarum præter propter centum ejusdem formæ, magnitudinis, & coloris in vesicâ bovinâ fuere inventæ. Ex his unam vel alteram diffractam, armato microscopio oculo examinatus reperi esse substantiam testaceam matris perlarum instar coloratam, & componi ex lamellis sibi invicem superimpositis, ut in ipsâ matre perlarum necnon quibusdam vesicæ calculis conspicitur; unde jam hic auri coloris splendor, cum in nullis aliorum animalium calculis (saltem quantum scio) observatus, non facile penetra, nisi ad filium in urinis differentiam confugere liceat, quæ aureum colorem induxerit; quod confirmaretur ex parte, quod alchemistæ quidam in urinis magnum secretum quærant.

"Prodiit in Palatanatu ante aliquot septimanas partus monstruosus capite admodum deformi instar ululæ. Hujus iconem, & quid rari in usus anatomiz observatum sit, datâ occasione transmittam."

Mr. LISTER affirmed, that he had divers times observed the like in an ox's bladder: that he had taken out of one ox about 150; and that he had formerly sent several of them to the Society.

Mr. HOOKE shewed a new helioscope, which he had lately made, whereby the figure and true shape of the sun, and the spots of it might be better observed than by any ways yet made use of. He explained the particulars of it.

Several experiments about the propagation of motion were prepared; but it being past seven o'clock, the Society adjourned.

July 27, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,

Mr. HENSHAW

Dr. GALE

Mr. HILL

Dr. GREW

Dr. KING

Mr. HOOKE.

The President, Mr. HENSHAW, Mr. COLWALL, Dr. GALE, Dr. CROUNE, Dr. KING and Mr. HOOKE were appointed a committee to go to Chelsea on the Saturday following, and to meet at the Swan-tavern there at nine in the morning to speak with the Lord CHENNY about inclosing the ground of Chelsea-college next the meadows.

It was resolved, that a legal course should forthwith be taken for recovering the arrears of the Society; and that the president be desired to speak immediately to Mr. BALLARD, that it might be dispatched.

At

At a meeting of the SOCIETY on the same day, the president in the chair :

The minutes of July 13 were read : whereupon it was farther observed, that martens were frequently found upon the downs in Wiltshire : that there were also a sort of black pole-cats : that sables seemed to be of the same kind, having the ridge on their backs, and the tips on their tails, black, but that they were yellow under the belly : and that pole-cats, weefels, martens, &c. were of the fox-kind.

Dr. TYSON related, that he had taken the liquor out of the glands or bag of a weefel, and keeping it a considerable time in a paper, found that it had a very sweet and pleasant smell like musk : that he had observed the same sort of bags in pole-cats, weefels, martens, foxes, dogs, cats, rabbits, hares, rats, mice, &c. as also in snakes, vipers, and fowls, as ducks and geese, which have it contained in pipes, and turkeys and hens in bags : that the ostrich has likewise such a bag, not on the rump, but higher on the back.

Hereupon Dr. TYSON was put in mind to complete and publish his description of the anatomy of an ostrich ; which he promised to do.

He shewed a draught from the life of an embryo preserved in spirit of wine, not bigger than a bee, very completely shaped.

He took notice also, that he had observed lobsters and vipers to have double genitals ; and that snails, worms, and leeches are hermaphrodites.

Mr. HOUGHTON read a paper of queries, which he had recommended to a brother of his, who had been in Virginia, together with his answers and observations thereupon.

Mr. HENSHAW presented several letters and papers sent by Sir PETER WYCHE from Hamburgh concerning Dr. WASMUTH's altronomico-chronological tables and hypothesis.

It was desired, that some of the members would peruse them, to see what was contained in them.

Dr. PELL and Mr. CLUVERUS, being both present, who had formerly perused these tables, conceived them to be of little worth.

Mr. HOOKE shewed his new-contrived aperture for long telescopes, which would open and close just like the pupil of a man's eye, leaving a round hole in the middle of the glass of any size desired ; which was well approved of.

He shewed an experiment of making musical and other sounds by the help of teeth of brass-wheels ; which teeth were made of equal bigness for musical sounds, but of unequal for vocal sounds.

He shewed likewise his helioscope perfected by a double reflection, which would exhibit the figure of the sun very perfectly.

*Octob. 5.* at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,	
Sir JOHN LAURENCE	Mr. ASTON
Mr. COLWALL	Dr. CROUNE
Mr. HILL	Mr. PERRY
Mr. HENSHAW	Mr. HOOKE.

The president acquainted the Council with some treaty, which he had lately with Sir STEPHEN FOX concerning Chelsea-college.

It was agreed, and ordered, the President and Mr. EVELYN be desired to treat with Sir STEPHEN FOX about selling the house and the whole concerns of the college (Sir STEPHEN FOX having by letter to the president declared, that he would not treat for the house alone, without all the concerns of the Society in Chelsea) and the President and Mr. EVELYN were empowered to set a price for the house and land, viz. 1500*l.* if it might be agreed; but not under 1400*l.* and in case the last sum be not agreed to, the matter was to be again referred to the Council: and the President and Mr. HOOKE were desired to speak with Mr. LANE, that he would immediately assort the papers relating to the Society's title to Chelsea-college, that they might be ready to be produced to Council.

*Octob. 19.* the Society, upon summons sent to the respective members, met again at Gresham-college.

The president being prevented from coming by extraordinary business, the members present desired Mr. EVELYN to take the chair.

Mr. HOOKE read a letter to Mr. EVELYN from Mr. WILLIAM LONDON, dated at Barbadoes 28 Decemb. 1680, wherein he declared his intention of writing a history of Barbadoes, and therein giving a true account of the situation, survey, seasons, natural productions, plantations, people, artificial curiosities, trade, government, governors civil, military, and ecclesiastical; of the customs and manners of the people, &c. designing also to do the same thing in the same method for all the other English plantations in America; and adding the heads of his discourse: which being likewise read, were judged very full and exact. But having in his letter desired the advice and assistance of Mr. EVELYN and of the Royal Society, a committee was appointed to consider farther of his proposals; and to communicate to Mr. EVELYN what they should think proper to be farther done by the said Mr. LONDON. The persons named of this committee were Mr. HILL, Mr. ASTON, Dr. PLOT, Sir JOHN HOSKYNs, if in town, and Mr. HOOKE; who were to meet the next day at Gresham-college.

Mr. LONDON having also requested Mr. EVELYN's assistance in procuring him  
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by some means some of the spice-trees from the West-Indies, the same was discouraged of, and the difficulty of such a business mentioned. However Mr. EVELYN remarked, that VAN MUNTING<sup>b</sup> had produced those trees, and kept them growing in Holland: and Mr. HOOKE related, that he had been lately informed by one Mr. WHISTON, a broker, that he had procured out of Holland three nutmeg trees growing in pots. It was notwithstanding looked upon as extremely difficult to procure any such for Mr. LONDON.

Mr. EVELYN observed, that HOLLINGSHEAD in his *Chronicle* affirms, that saffron was first brought into England in the head of a pilgrim's staff.

Mr. HOOKE shewed a letter of Mons. JUSTEL, giving some account of the quinquina or Jesuit's bark; as also of the increasing of the power of the loadstone. Mons. JUSTEL being now come to England, it was hoped, that he would give a farther account of those and other particulars mentioned in the said letter.

Mr. HAAK shewed some new books, which he had lately received from abroad. The first was three folio's of OLAUS RUDBECK, professor at Upsal in Sweden. The subject of this work was the antiquity of the Northern countries, and particularly of Sweden, and the language and character of this country. The person, who brought this work to Mr. HAAK, was present, and said, that he designed to send for more copies of it out of Sweden.

The other book was a natural history of Bohemia, printed at Prague 1680, in fol. and intitled, *Miscellanea historica Regni Bohemie: auctore BOHUSLAV BALBINO & Soc. Jesu.*

Mr. HAAK presented two books. one intitled *Cometarum natura, motus, et origo, secundum HEVELII & PETITI Hypothesen*; auctore JOH. CHRISTO. STURMIO; printed at Altorf in 4to. The other was a French translation of Dr. PAPIN's book on softening of bones, printed at Paris.

Dr. GALE brought in three books, which he had received from Dr. BOHN at Leipzig, viz. 1. GEORGII CASP. KIRCHMAYERI de *Pneumathicis, naturalis lucis, & ignis*: Wittemberg 1680, 4to. 2. *Exercitatio* \* \* \*.

Mr. HOOKE shewed a new invention of his concerning the true figure of the rhomb-lines in the polar projection of the planisphere; as also a way of drawing all the said lines true upon such a projection of any bigness; with a method of finding the length of any part of any such line; and of straitening the said line or any part thereof with ease and certainty, and thereby answering many questions in navigation without calculations by the help of a ruler and compasses without the use of tables.

<sup>b</sup> ABRAHAM MUNTINGIUS, author of the book *De vest. herb. Britannici*, printed at Amsterdam 1681, in 4to.

\* The rest of the minute was left thus imperfect.

Octob. 26, Sir JOHN HOSKYNs, vice-president, in the chair:

The minutes of the preceding meeting were read, and discoursed upon, and particularly about the directions for Mr. LONDON.

Sir JOHN HOSKYNs mentioned, that the memoirs of the French about the method of describing \* \* would be fit to be perused by Mr. LONDON, as containing a very good method for that purpose.

He remarked likewise, that there was in the *Quadripartitum botanicum* of SIMON PAULI a very useful varnish for preserving plants.

Hereupon was occasioned a discourse about glues and varnishes; and Dr. KING affirmed upon his own experience, that the gelly of bones made in Dr. PAPIN's method was an excellent cement for glasses.

Dr. GALE related, that he had found \* \* \* \* that they had a way of glueing wood by dipping a cloth in glue, and putting it between the pieces.

He reported, that he had been newly informed, that Prince RUPERT had lately desired a patent for a person, who had the way of making a gun-powder ten times stronger than the common powder.

Dr. GALE was desired to peruse OLAUS RUDBECK's book, and give some account of it to the Society.

Mr. HOUGHTON shewed two bodies, supposed to be the pizzles of a shark.

Nov. 2, Sir JOHN HOSKYNs, vice-president, in the chair:

Dr. HUGH CHAMBERLAYNE signed the usual obligation, and was admitted.

HENRY EVE, Esq; and WILLIAM PAYNE, M. A. rector of St. Mary White-chapel, were propounded candidates by Dr. TYSON; and WILLIAM PENN, Esq; by Mr. HOUGHTON.

The minutes of Octob. 26 were read, and several parts farther discoursed of, particularly that about the double pizzle of a shark; which Dr. TYSON said to be a mistake, since that fish had not a double, but only a single pizzle.

Mr. HOOKE produced a letter, which he had newly received from Mr. LLEWENHOECK, dated at Delft Novemb. 4, 1681, N. S. which being written in Low Dutch, and very long, was referred to the next meeting: and in the mean time Mr. HOOKE was desired to procure an English translation of that letter.

Dr. CROUNE moved, that Mr. LLEWENHOECK's letters might be all printed: to which Mr. HOOKE answered, that the greatest part of them were already printed:

in the *Philosophical Transactions and Collections*; and that there was another of them going to be printed; and that he designed to publish the rest in some succeeding *Collections*.

Mr. HAAR produced a paper, which he had lately received from a gentleman of Berne in Switzerland, being a letter in Latin from SIGISMUND KONIG, M. D. of that city, dated there 30 Sept. 1681<sup>4</sup>, containing a large account of the symptoms of a woman, a patient of his, who had voided great quantities of stones and other calculous matter by vomit, stool, and urine; together with a small box, containing several of the substances so voided. This letter being very long was reserved for the next meeting.

Mr. HOOKE shewed a mechanical way of finding the focus of all parallel rays falling upon the spherical superficies of a more dense refracting medium (whereby would be avoided the tediousness of calculating several triangles for the finding the focus of every single ray) by the motion of a certain circle upon a point in its diameter excentrically taken, according to a proportion assigned.

He also shewed the geometrical ground and demonstration of the same: and though it was denied by Mr. FLAMSTEAD as false and impossible, yet Mr. HOOKE persisted in his proposition, and referred it to be judged by Sir CHRISTOPHER WREN, who, he doubted not, would easily satisfy the Society of the truth and evidence thereof.

Mr. HOOKE likewise engaged to produce at the next meeting a mechanical way of finding the foci of all the parallel rays falling perpendicularly upon the plain of a plano-convex glass, where the convexity was turned towards the foci thereof: as also the geometrical demonstration of the truth and certainty thereof; which Mr. FLAMSTEAD also denied as impossible.

Novemb. 9, Sir JOHN HOSKYNs, vice-president, in the chair:

The minutes of the preceding meeting were read and discoursed upon.

RICHARD ROBINSON, M. D. was propounded candidate by Dr. TYSON.

Mr. FRANCIS LODWICK was proposed candidate by Mr. HOUGHTON.

Mr. EVE, Mr. PAYNE, and Mr. PENN, were elected fellows of the Society.

Mr. HOUGHTON presented from Mr. PENN his map of Pennsylvania.

Mr. RICHARD WALLER presented a picture of Dr. GODDARD, drawn by Mr. WALLER himself on memory, after the death of Dr. GODDARD. It being viewed by those, who were present, and knew the doctor, was judged to resemble him in

<sup>4</sup> Letter book, vol. viii. p. 165. It is printed p. 68. Decemb. 10, 1681.  
in Mr. HOOKE's *Philosophical Collections*, N°. ii.

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many particulars, and ordered to be carefully kept with the other pictures of the fellows of the Society.

Mr. HOUGHTON presented the Society with a book, which he had met with ; which being a book of art, he thought it proper to be kept among the Society's books. It was a book of curious patterns for laces and needicworks.

He presented likewise a curious humming-bird.

Mr. HOOKE produced a translation of the long letter lately received from Mr. LEEWENHOECK, and dated 4 Nov. 1681, N.S. which he read ; containing an account of divers observations and discoveries, which he had lately made concerning great numbers of small animals in his excrements, which were most numerous when he was troubled with a loofeness, and very few or none, when he was well. He also found the same very observable in the excrements of other animals, &c &c.

Mr. HOUGHTON acquainted the Society from Mr. SAMBROOKE, that his brother Mr. HODGES was in a short time going to the East-Indies to reside at Haukly upon the river Ganges ; and that he was very ready to serve the Society in what he was able in that place ; and therefore desired, that he might receive some directions from the Society in what particulars he could be serviceable to them there.

Dr. TYSON gave an account of his having lately dissected a young lion, in which he had taken notice of several things very considerable ; and, amongst the rest, that this, as well as most other carnivorous creatures, had a very considerable scent-bag ; which he also shewed, and promised to give a more full account of all his observations in writing.

Dr. SLARE gave an account, that he had made many chemical trials of several sorts of calculous matters ; and had found them all to contain a kind of urinous or volatile spirit and salt, as other animal substances.

Mr. HOOKE shewed and demonstrated a very expeditious way of finding all the possible foci of parallel rays refracted by a plano-spherical lens ; whereof the convex side was turned towards the focus ; as also what quantity of rays would pass through such a glass, whose convexity was the full bigness of a hemispherical.

Mr. HOOKE likewise acquainted the Society, that Mr. FLAMSTEAD had now acknowledged, that what he had formerly adjudged against the problem shewn and demonstrated at the last meeting by Mr. HOOKE, concerning the foci of parallel rays refracted by an hemispherical surface, was a mistake of his ; and that upon considering it more seriously he had found out the demonstration, though he had not done it before the way of demonstrating it was shewn by Mr. HOOKE.

November 16, at a meeting of the COUNCIL were present,

\* This letter is printed in Mr. HOOKE's Philosoph. Colled. No. iv. p. 93.

	Sir CHRISTOPHER WREN, president,
Sir JOHN LAURENCE	Mr. ASTON
Mr. HILL	Mr. HOOKE.

It was agreed and ordered, that the President, Sir JOHN LAURENCE, Mr. COLWALL, Mr. ASTON, and Mr. HOOKE, be a committee for auditing the treasurer's accounts; and they were desired to meet for that purpose before the next anniversary election.

The president discoursing concerning the library of the Society, promised to give the Society five pounds to be expended in books of geometry: and Mr. HOOKE was desired to find out such books, as he should find proper, and were not already in the library. And the Council taking into consideration the improvement of the library, thought fit to order, that there should be annually expended the sum of ten pounds in purchasing philosophical books.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN, president, in the chair:

The minutes of the 9th instant were read, and some parts discoursed of.

Sir ROWLAND WYNNE was proposed candidate by Mr. HILL.

Mr. ISAAC DORISLAUS was proposed candidate by Dr. ALLEN.

Upon a discourse concerning instruments useful for the sea, Mr. HOOKE mentioned some contrived by himself, which would be of great use for taking azimuths, altitudes, &c. by a new way not before practised, which he designed shortly to publish. He observed likewise, that he had been newly informed by a person skilful in sea-affairs, who had been several voyages to the East-Indies, the Straits, and elsewhere, that he had been able to see the horizon at sea in a star-light night, and so to take an altitude from it: and that he could thereby find the variation of the compass.

The president was desirous, that a good and easy contrivance should be thought of, and made for an azimuth compass, in order that observations of that kind might be made more often and more certain by seamen; the difficulty of making which observations with the instruments now known being the greatest reason, why there were so few good observations of that kind. He farther observed, that no good observations could be made at sea by the help of a perpendicular, which was the reason of discontinuing the use of the astrolabe, and making use of the sea-quadrant and back-staff.

Mr. HOOKE mentioned a quadrant of his contrivance, which he was now making, and would shortly produce, and which, he conceived, would be much more accurate than any yet used for that purpose, and which would obviate divers objections: but that some parts of it were yet unfinished.

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The skin of a large crocodile stuffed, brought out of Egypt, was presented from Sir NICHOLAS CRISPE to the Society, and delivered by Mr. Houghton.

Mr. HILL inquired concerning the stone sent from the East India company to be examined by the Society. It was thought that this stone had been long since returned to the company, with an account thereof.

There being some present, who had not heard Mr. LERWENHOEK's letter read at the last meeting, it was desired, that the abstract of it might be again read; which was done, and thereupon some conjectures were made about the porosity and pith of several sorts of hair. The president remarked, that there was a sort of rabbits, who had a kind of long hair, which was branched towards the top. He mentioned also the cleaving of several sorts of hair, as that of men's heads, and of pigs bristles. He conceived likewise, that the horn of a rhinoceros was a kind of hair; as were also the fins of whales; both which were observed to be very apt to cleave.

Mr. HOOKE shewed the beard of a morfe, which was very remarkable, having strong and crooked bristles much like horn, but harder and bigger than the teeth of a large horn-comb, or of a wheat-straw, and hollow at the roots in the flesh.

Dr. GREW presented from Mr. LISTER fifteen copper-plates of a book concerning insects, which he was printing.

Mr. HOOKE brought in the demonstration of a new way of solving the phenomena of refraction, by supposing the denser body to refract towards the perpendicular; and shewed, that the line of light, that passes through two or more different media obliquely to the contiguous surface of the transparent media, the bulk of the bodies of both media lying in that refracted line, is the least quantity, that is possible to be moved to communicate motion from the luminous to the enlightened body.

Mr. HOOKE also acquainted the Society with two sorts of compasses, which he was making, for describing all sorts of spiral lines for the rhombs.

He mentioned likewise, that Mr. FLAMSTEAD had now confessed, that he was mistaken in his assertions against the problem; which Mr. HOOKE had formerly demonstrated to the Society concerning the new way of measuring distances in great circles laid down on the planisphere projection of the globe by the help of a sector and compasses, without drawing lines or circles, or making any divisions, &c. which had been by Mr. FLAMSTEAD before the Society impugned as false; but now he acknowledged it to be true and real, as demonstrated by Mr. HOOKE.

*November 23, at a meeting of the COUNCIL were present,*

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Sir JOHN LOWTHER †.	Sir CHRISTOPHER WREN, president,
Mr. COLWALL	Dr. CROUNE
Mr. HILL	Dr. KING
Mr. ASTON	Mr. PERRY
	Mr. HOOKE.

Mr. HILL brought in the conveyance from Sir JOHN BANKS of a fee farm-rent of twenty pounds *per annum*, which was ordered to be put into the chest.

Dr. BROWN was desired to speak to the Lady GRACE PIERREPOINT<sup>f</sup>, in order to recover the arrears due from the late Marquis of Dorchester<sup>g</sup> to the Society.

At a meeting of the SOCIETY on the same day :

The president and vice-president being not yet come, and a great number of the Society being present, Mr. HENSHAW was desired to take the chair, in order to discourse of some discoveries made by Mr. LEEWENHOECK, particularly about the substance and figure of hair : and it was judged, that the glasses, wherewith he had made all those strange discoveries, were very extraordinary, and made in some other manner than what was commonly known and made use of.

Mr. HOOKE was of opinion, that they were no other than those mentioned in the preface to his *Micrographia*, viz. very small transparent globules used whole, or by grinding reduced to a lens, or by another way, mentioned also by him in the same preface, much more easy to be made ; a specimen of which, he said, he would shortly shew, as he had long since done to the Society. These he conceived were helped by the way of admitting light upon them in an appropriated room by the extraordinary pains and care of Mr. LEEWENHOECK, in examining the objects in various ways.

However Mr. HENSHAW moved, that Mr. LEEWENHOECK should be requested to communicate or publish his invention, if it were any new way ; which the secretary promised to do in his next letter to Mr. LEEWENHOECK.

Sir JOHN HOSKYNs, vice-president, took the chair.

Sir ROWLAND WYNNE was elected by twenty-five suffrages : And,

Mr. JODOCUS CROLL and Dr. ROBINSON were elected by the same number of suffrages.

Mr. HESSACK, a Swedish gentleman, was proposed candidate by Dr. GALE and Mr. HOOKE : And,

Signor GREGORIO LETI by Sir THEODORE DE VAUX.

<sup>f</sup> Younger daughter of HENRY marquis of Dorchester.

<sup>g</sup> He died Decemb. 1. 1683.

Sir ROWLAND WYNNE, Mr. PAYNE, and Mr. EVE, subscribed the obligation, and were admitted.

Mr. HOOKE produced a new sort of instrument for describing the rhombs or spiral lines upon the plano-spherical projection on the pole of the world; and he shewed how the same would easily describe all manner of proportional spirals, whether greater or less, whether wider or narrower; and mentioned also what use it might be of for navigation and sea-charts.

*November 30.* The members of the Society having had the usual summons from the president to meet this day, in order to the electing the council and officers of the Society for the year ensuing, there being about thirty present, when the president, Sir CHRISTOPHER WREN, took the chair, after the secretary had read the statutes concerning the election, the Society proceeded to the election of some candidates, viz.

Mr. FRANCIS LODWICK,  
Signor GREGORIO LETI,  
Mr. ISAAC DORISLAUS.

Mr. PITT of Wadham-college in Oxford was proposed candidate by the president.  
Mr. SAMUEL BLACKBURNE by Mr. PEPYS,  
Mr. HEWER by Mr. HOUGHTON,  
Mr. JOSEPH MARTIN by Mr. HOUGHTON.

Sir JOHN PERCIVAL, Dr. ROBINSON, Signor LETI, and Mr. CROLL subscribed the obligation, and were admitted.

Whilst the lists were gathering, Monf. LYENBERGH, envoy from the king of Sweden, presented the Society with a letter<sup>a</sup>, and two books, from Dr. OLAUS RUDBECK, professor of anatomy at Upsal in Sweden: for which the president returned the Society's thanks to the envoy, and ordered the said letter and books to be produced at the next meeting, that so a more full account might be taken of them.

Monf. LUDOLFUS presented to the Society from his uncle Monf. JOB LUDOLFUS his description of Æthiopia.

The Society then proceeded to the election, and chose the following eleven members to be continued of the Council for the ensuing year;

Sir CHRISTOPHER WREN  
Mr. ASTON  
Mr. COLWALL  
Dr. CROUNE  
Dr. GALE  
Mr. HENSHAW

Mr. HILL  
Mr. HOOKE  
Sir JOHN HOSKYNs  
Sir JOHN LOWTHER  
Sir JOSEPH WILLIAMSON.

And the following ten members were chosen in the Council ;

Mr. AERSKINE  
Mr. EVELYN  
Mr. FLAMSTEAD  
Dr. GREW  
Mr. HALL

Mr. PACKER  
Mr. PEPYS  
Sir ROBERT SOUTHWELL  
Dr. TYSON  
Dr. WOOD.

The officers elected were,  
Sir CHRISTOPHER WREN, president,  
Mr. HILL, treasurer  
Mr. FRANCIS ASTON  
Mr. HOOKE, } secretaries.

Then Dr. GREW, Mr. HALL, Mr. PACKER, Sir ROBERT SOUTHWELL, Dr. TYSON, and Dr. WOOD, were sworn of the Council.

Several months before this election died Sir JONAS MOORE, Knt. who was born at Whitbee in Lancashire<sup>a</sup>, about the year 1615<sup>1</sup>, and distinguished himself very early by his knowledge in mathematics and astronomy ; so that his friend Mr. SHERBURNE<sup>a</sup> represents him as eminent in the latter in the year 1640.

Whilst king CHARLES I. was at Durham, in his expedition to the northern parts, being acquainted by a person of quality with Mr. MOORE's studies, his majesty admitted him to give an account of them to himself, and encouraged him to pursue them, with a promise of encouragement. His majesty being afterwards at Holdenby-house in 1647 directed, that Mr. MOORE should be employed to instruct the Duke of York, then at St. James's, in arithmetic, the uses of the globes, and geography : but the malicious and cunning subtilty, as Mr. MOORE expresses it<sup>1</sup>, of Mr. ASCHAM<sup>a</sup>, and the Duke's escape from St. James's, April 21, 1648<sup>2</sup>, prevented his Highness from making any great progress under Mr. MOORE. His loyalty was in those times a considerable prejudice to his fortune ; but in his greatest necessity he was assisted by Col. GILES STRANGWAYS, then a prisoner in the Tower in London, who likewise recommended him to the other eminent persons, his fellow-prisoners, and prosecuted his interest so far, as to procure him to be chosen surveyor in the work of draining the great level of the fens<sup>3</sup>.

<sup>a</sup> Catalogue of astronomers, antient and modern, p. 93. subjoined to the translation of the Sphere of MANILIUS, by EDWARD SHERBURNE, Esq; Edit. London, 1655. Fol.

<sup>1</sup> It appears from the inscription under his picture, prefixed to his *Arithmetick*, that he was in the 45th year of his age in 1650.

<sup>2</sup> *Ubi supra*.

<sup>3</sup> Dedication of his *Arithmetick* in 1665 to the duke of York.

<sup>a</sup> Mr. ANTHONY ASCHAM, who had been ap-

pointed by the long parliament tutor to the Duke of York. Mr. ASCHAM had been educated at Eton-school and King's-college, Cambridge ; and being sent agent from the parliament to the court of Spain, was assassinated at Madrid June 6, 1650, by some of the royal party.

<sup>4</sup> WHITELOCKE's Memorials, p. 301. Edit. London, 1732.

<sup>5</sup> Dedication of his *Algebra*, published in his *Arithmetick*, to the Colonel.

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Soon after the Restoration he published at London, in 8vo. his book intitled, *MOORE'S arithmetic*: in two books. *The first treating of the vulgar arithmetic in all its parts, with several new inventions to ease the memory, by NEPER'S rods, logarithms, decimals, &c. fitted for the use of all persons*: *The second of arithmetic in species, or algebra, whereby all difficult questions receive their analytic laws and resolution, made very plain and easy for the use of scholars, and the more curious. To which are added two treatises, 1. A new contemplation geometrical upon the oval figure, called the Ellipsis*: 2. *The two first books of MYDORGIUS'S conical sections, analysed by that reverend divine Mr. W. OUGHTRED, Englished and completed with cuts.* By JONAS MOORE, professor of the mathematics. In the preface, dated from his house in Stanhope-street, June 10, 1660, he remarked, that in this edition of his *Arithmetic* he had endeavoured to correct the mistakes both of pen and press, and to alter all such passages and rules in the former edition, as he had heard to be objected to, or found too abstruse or difficult: but that the times had not encouraged him to finish or complete many pieces, which he had formerly promised and had by him. "Indeed, added he, the abuse in the birth in the midwife's hand is none of the least discouragements: a piece of mine of astronomy and astronomical tables, which cost me a year's labour and above, was stilled in the press, when one sheet was brought forth, and a great part of the copy lost, though I know the method, not yet used by any, would have infinitely pleased the ingenious."

About June 1663, he was sent by the government in some office to Tangier\*, and after his return was advanced to the post of surveyor of the ordnance, and knighted by king CHARLES II. Being proposed candidate for election into the Royal Society by the Lord Viscount Brouncker, Novemb. 30, 1674, he was chosen into it on the 3d of Decemb. following; as he was afterwards into the Council of the Society. In the same year 1674 was published at London in 12mo. a treatise collected out of his notes and papers, by Mr. NICHOLAS STEPHENSON, intitled, *A mathematical compendium; or useful practices in arithmetic, geometry, and astronomy, geography and navigation, embattelling and quartering of armies, fortification and gunnery, gauging and dyalling; explaining the logarithms with new indices, NEPER'S rods or bones; making of movements, and the application of pendulums; with the projection of the sphere for an universal dial, &c.* The last work, in which he was engaged, but did not live to see published, was his *New system of the mathematics*, printed at London in 1681 in 4to. This was designed by him for the use of the royal foundation of the mathematical school in Christ's Hospital in London, of which hospital he had been chosen some years before his death one of the governors. Of this work the arithmetic, practical geometry, trigonometry and cosmography, were written by Sir JONAS himself, and printed during his lifetime. He was ready to enter upon the chapter of navigation, and conceived himself within view of the conclusion of his work, when death put a period to his labours, which happened answerably to his own desire, that of ending his days in the service of his royal master, upon whom he was attending in a journey; his death being so sudden, that he had no time to make a will†. He left a son, for

\* See above, Vol. i. p. 259.

† Preface to his *New system of the mathematics*.

‡ Mr. ASTON'S letter to JOHN FRIC OLNEER.

June, 1683, Letter-book, Vol. ix. p. 17.

whom he had procured a reversion of his office of surveyor general of the ordnance, and who enjoyed it for a few years, till his death'. Two of his daughters were married to Mr. WILLIAM HANWAY and Mr. JOHN POTTINGER, who both dedicated his *New system of the mathematics* to king CHARLES II. Sir JONAS was the great patron of Mr. FLAMSTEAD, for whom he obtained, in March 1674, the place of royal astronomer, with a salary of an hundred pounds a year payable out of the office of ordnance; and when the building of a royal observatory was resolved upon in 1675, he inclined to Hyde park as a proper place for it; but Sir CHRISTOPHER WREN mentioning Greenwich, it was immediately fixed upon'. He translated from the Italian of TOMASO MORETTI *A treatise of artillery, or great ordnance*; which translation, with an appendix of artificial fire-works by Sir ABRAHAM DUGER, was printed at London 1683 in 8vo.

Decemb. 7, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN, president,
Sir JOHN LOWTHER	Dr. GREW
Mr. AERSKINE	Dr. TYSON
Mr. HILL	Dr. WOOD
Mr. HENSHAW	Mr. ASTON
Mr. PACKER	Mr. HOOKE.
Mr. PEPYS	

Mr. AERSKINE and Mr. PEPYS were sworn of the Council.

Mr. ASTON was sworn secretary.

The President desired, that the statutes concerning the payments of the members of the Society, and also concerning the causes of ejection, might be transcribed into a paper for the next Council to consider and debate.

Mr. HENSHAW reported to the Council, that he had treated with Mr. FRANKLIN about the arable and meadow ground of Chelsea-college; and that he was to have a lease of the same for twenty-one years, to commence from Christmas last, at the rate of thirty-two shillings *per ann. per acre* for the arable, and *per annum* for the meadow.

The order of November 23, wherein Sir JOHN HOSKYNs, Mr. HENSHAW, and Mr. HOOKE, were desired to be of the committee, to treat with Mr. FRANKLIN about his lease, was revived, and they were desired to employ immediately a scrivener to draw up a book of the said lease, to be offered to the next meeting of the Council. And Mr. HENSHAW was desired to give such instructions, as were necessary, according to the agreement, which he had made: and because there were pretences still on foot relating to the way, the Council thought fit, that the number of acres should be expressed, that the Society's right might not be pre-

\* General Dictionary, article of FLAMSTEAD  
[JOHN] Vol. v. p. 254.

\* Ibid.

\* Ibid. p. 259. note E.

judiced : and whereas Mr. HENSHAW reported, that he had agreed after the rate of thirty-two shillings the acre, that the rent should be expressed in the gross sum by computation, with a reasonable abatement for the prejudice, which that pretence might do to the tenant.

It was ordered, that the tenant be summoned to attend the next meeting of the Council, and that Mr. HUNT do call on the man of the Pie in Chelsea, who had dug and carried away gravel out of the college-ground, that he fill up, and level the same.

The papers, which were formerly left in the hands of Mr. LANE, to consider, digest, and make an abstract of the title, were brought back, and left in the custody of Mr. HOOKE.

It was ordered, that Mr. HOOKE should take care, that all orders of Council should be transcribed into the Journal-book.

The President and Mr. PACKER undertook to peruse the writings of the Society, and to make an abstract of them.

At a meeting of the SOCIETY on the same day, the president, Sir CHRISTOPHER WREN, in the chair :

Dr OLAUS RUDBECK's letter and two books, presented on St. Andrew's day by Mons. LYENBERGH, envoy extraordinary from the king of Sweden, were now produced, and the letter read. Whereupon it was ordered, that Mr. CLUVERUS should be desired to peruse Dr. RUDBECK's work, and make an abstract of the principal matters contained in it, and give the Society his judgment of it : which being done, Mr. ASTON was desired to return the author the thanks of the Society<sup>1</sup>, with some account of the sentiments of those, who had perused his work.

Mr. HOOKE produced a paper, which he had received from Mr. HAAK, being an account of the several things affirmed to be performed by Dr. ELSHOLT of Berlin ; which paper<sup>2</sup> was read. It contained an account of, 1. His universal balsamation. 2. His great vine and wine cure in five particulars, viz. for improving the vine, procuring and regulating fermentation, improving it in the vessel and in the glass, and making artificial wines. 3. His way of making wines with water. 4. His way of making vinegar of water. 5. His true way of distilling spirits from grains. 6. Of making essence of vegetables. 7. Of depurating alkaline salts and pot-ashes. 8. Of ambering or perfuming in *infinitum*.

It was desired, that Mr. HAAK might be furnished with a proper answer by the secretaries.

<sup>1</sup> Mr. ASTON's letter is dated in January 1681.  
Letter-book, Vol. 8. p. 185.

<sup>2</sup> It is printed in Mr. HOOKE's Philosophical  
Collect. No. iv. p. 104.

Mr. HOUGHTON shewed a small Chinese idol, curiously cut and polished out of a very hard and heavy stone.

Mr. JUSTELL, formerly proposed candidate by the President, being put to the ballot, was unanimously elected, and being present, was admitted by the President.

Mr. HOOKE gave an account of a small treatise of JOHN DANIEL MAYER, printed at Sleswick in 1679, and intitled, *Consideratio ferri radiantis, quæ in naturam ignis aut lucidi spiritus utcumque inquiritur. Quædam de thermis novo artificio parandis adduntur.* In which was contained an account of a very strange experiment to be made with a piece of iron heated till it be almost ready to melt; from which iron there will be emitted or darted forth every way a great number of sparkles, some of which will be of a most pure silver bright light. These the author affirms to be without any hurtful heat; so that being received on the back of one's hand they will not burn, nor affect it at all with heat. But Mr. HOOKE remarked, that he had newly tried the experiment with Mr. HUNT, and could not find any such effect; but on the contrary, that both of them had found the sparkles to burn or scald the back of their hands: and that, together with those bright sprinklings, there were other red-hot ones emitted, which, he said, MAYER affirmed, would burn; from whence he raised a new theory of light and fire. It was desired, that the experiment should be further tried, and an account thereof brought to the Society.

There was produced an experiment sent by Mr. BOYLE, to be shewn the Society. It was a new way of producing light by the effusion of two liquors, one upon the other; both which liquors were very clear and transparent, and afforded no light, when they were apart: but whilst they were poured one upon the other, they afforded a brisk light, which lasted for a little while in the vessel, that received them.

Mr. HOOKE produced two pendulum clocks, which he had procured and adjusted, in order to make trial of a curious inquiry concerning the attractive power of the earth at several distances from its centre. This was done by placing one of them at the top, and the other at the bottom of the pillar on Fish-street hill, and accurately examining, whether they would keep together; or whether that, which was nearest to the earth, would go faster. At which trial Mr. HOOKE desired, that some other members of the Society might be present to bear testimony of it.

Dr. SLARE produced a small piece of his solid phosphorus, and with it wrote upon a piece of paper; which was not visible, when the candles were in the room, but on removing them the letters shined very bright and vividly, and were very legible. But the candles being brought in again, the doctor warmed the paper by the fire, the letters appeared of a dark brown colour very legible.

Mr. HENSHAW produced a paper containing the milk-white pieces of g'ass, which had been so made by the corruption of a menstruum contained therein.

This

This substance was very brittle, and with one's fingers might easily be crumbled into sand. This was received from Mr. JOHN DWIGHT of Fulha.

Mr. HOOKE remarked, that he knew a menstruum, that would produce the same effect, *viz.* being put into a glass it would in a short time so corrode it, as to turn it all into a brittle milk white substance, like that now produced before the Society; but the parts of the glass above the surface of the menstruum would receive no damage by it.

Mr. HEISIG, a Swedish gentleman, who had been proposed candidate by Mr. HAAK and Dr. GALE, being permitted to be present, gave the Society a Lapland magical drum, and a Runic almanac cut upon a staff; and shewed a table curiously engraven on copper, and containing a full explication of the Runic language, published in Sweden by JOHANNES BURREUS long before WORMIUS had published his book on that subject.

He likewise gave an account, that one ANDREAS SPOLA, professor of astronomy at Upsal, had given him an account, in a letter dated in July 1680, that in May 1679, as he was hastening to Upsal, near the city of Jenkoping, upon a pretty high hill, he saw the lake called *Water*, and in it the island called *Wifengsburg*, and the people so plain, as to distinguish men from women, as if it had been but a quarter of a mile distant; whereas that lake was really not then visible, by reason of the interjacent hills, it being distant also at least twenty-two English miles. This happened at sun-rising.

Mr. HOOKE mentioned an observation somewhat like this, which was affirmed by a minister of Sligo in Ireland, that he himself, and several hundreds more, had seen in the sea the perfect representation of an island rising out of it, as it were, with trees on the hills very plain and conspicuous; but as soon as the sun was set, it perfectly disappeared. This was related by the person himself, being an archdeacon, in the presence of Dr. WILLIAM LLOYD, Bishop of St. Asaph.

The experiments to be tried at the next meeting, were that of the iron's radiation of silver bright sparkles; and a method of drawing an helix on a cone.

December 14, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN, president,
Sir JOHN HOSKYNs	Mr. HILL
Sir JOHN LOWTHER	Dr. WOOD
Sir ROBERT SOUTHWELL	Dr. GREW
Mr. HENSHAW	Mr. ASTON
Mr. PEPYS	Mr. HOOKE.

A draught of a lease of the meadow and arable ground of Chelsea-college to be let to Mr. FRANKLIN for twenty-one years from Christmas last, was read and approved; and Mr. FRANKLIN being called in, was acquainted with the conditions,  
to

to which he agreed, but desired to have the same to shew; which when he had done, he was to return it, that it might be ingrossed and sealed.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN, president, in the chair :

The minutes of the 17th instant were read.

OLAUS RUDBECK, M. D. and professor of anatomy at Upsal, was proposed candidate by Dr. GALE.

Mr. ASTON mentioned, that having perused some part of the said Dr. RUDBECK's works, presented by him to the Society, he had found him to be laborious as well as learned.

Sir JOHN HOSKYNs remarked, that he had been informed, that the Doctor, besides his knowledge in anatomy and antient history, was well skilled in botany, and now writing a history of plants; for which purpose he had already drawn and cut in wood above two thousand plants. That the first part of his designed work would be the history of such plants, as flourished, or could be made to grow, in Sweden, of which there were said to be two thousand, that flourished in that country.

Mr. BLACKBURNE was elected.

Upon reading the minutes taken about JOHN DAN. MAYER's experiments of the radiation of iron, Mr. HAAK, who shewed the book, remarked, that he was certified by the person, who had brought him the said book that he had himself tried the experiment of the not burning of the silver-bright sparklings of iron, and found it, as asserted by Mr. MAYER; and that the thing was not doubted of. But there were many present of another mind.

Mr. ASTON read an abstract of Mr. LUDOLFUS's history of Æthiopia, presented by the author to the Society, and he was desired, as soon as he conveniently could, to write a letter of thanks to Mr. LUDOLFUS \*.

Mr. HEISIO's paper about the strange appearance of the lake and island, mentioned in the minutes of the last meeting, was read.

Several things, which he had only shewn at the last meeting, were now presented to the Society; as, 1. A Runic almanac, being a stick about four feet long, and about two inches big. About three feet of it was a prism of eight sides, and the other foot was round like the handle of a two-handed sword. Upon the eight sides of the prism the whole length was cut the almanac Runic; Runic signifying nothing else but letters: but the interpretation was not shewed. 2. A Lapland

\* Mr. ASTON's letter in Latin, dated 10 December, 1681, is inserted in the Letter-book, Vol. viii. p. 189.

drum,

drum, and the beater or drum-hammer, much the same with that described by SCHOEFFER. 3. A piece of brass with rings hanging by chains, called the frog, which the Laplanders lay on their drum-head, when they beat it, and by knocking with their drum-stick or hammer are said to make it dance to and fro upon the drum-head, till at last it fixes upon some figure made upon it, and will not be thence removed by any farther taboring : which having found, they pretend, that that mark, on which the frog rests, gives them sufficient information.

Mr. HEISIG left also for the repository a pebble, and some tin twist, affirmed to be drawn only by the teeth : but the twist being examined, was concluded to be made much in the same way as our silver twist is.

Mr. HUNT brought in from Mr. WYBERD, son of Dr. WYBERD, as a present to the Society, a small ivory box, in which was contained some curious writing made by the doctor, being the Ten Commandments, the Creed, and the Lord's Prayer, all written within the compass of a silver penny ; together with a problem solved by him concerning some properties of an ellipsis.

Mr. HOOKE shewed an engine for exactly describing all manner of proportion and helixes upon cones and cylinders ; as also of making or turning any variety notable in the shape of any fish-shell ; and all helixes, screws, crenated, foliated, echinated, wreathed, &c. conchoeids ; and he observed, that this engine would be of great use for making the divisions of mathematical and astronomical instruments, for turning wreathed work, and many other uses.

Divers members of the Society were well pleased with the contrivance ; and Mr. PACKER urged very earnestly, that a complete engine should be forthwith made ; at least, that some workmen should be consulted what such an engine well made would cost : and he desired, that a description of it might be brought in by Mr. HOOKE.

The experiment proposed by Mr. HOOKE for the next meeting was an engine to draw all the rhomb-lines upon a globe as truly and exactly, as any greater or lesser circles could be drawn upon it ; which had never been yet done by any person ; with an explanation of the true nature and properties of all such lines, &c.

Decemb. 21, the president and vice-president being absent, Mr. HENSHAW was desired to take the chair.

Mr. HILL presented a box of cedar-seeds.

The minutes of the last meeting were read.

Mr. ASTON read a letter of his to be sent to Mr. LUDOLPHS, returning him the thanks of the Society for the present of his book.

Upon mentioning the agate and crystal mountains, and several other hard  
VOL. IV. Q stones,

stones, as load-stones and gems found in some plenty in the northern parts of Sweden and Lapland, Dr. GALE related, that EPIPHANIUS mentions, that divers of these stones were found in the northern regions, and particularly that there were three sorts of hyacinths to be found there.

Mr. HAAK shewed two sheets, with a draught belonging to them, written by Dr. ELSHOLT of Berlin, containing a description of several sorts of phosphorus known to him, and their effects :

1. Of the phosphorus Bononienfis.
2. Of the phosphorus Baldwini.
3. Of the phosphorus Smaragdinus.
4. Of the phosphorus fulgurans.
5. Of the phosphorus liquidus.
6. Of the phosphorus stillatus nubilofus & \* \* \*.

A letter of Monf. ERNESTUS GOTTFREIDUS HEYSIUS to Mr. HAAK was read, containing an account of several remarkable particulars :

1. Concerning a second edition of Dr. PAPIN's book about softening of bones, and the improvement of it in France; and of a book of Dr. DAURAN about the alteration of the juices of the body by a natural chemistry.

2. Concerning a book of Monf. DU VERNEY, *Circa spirituum animalium generationem, quo distos spiritus non tantum in substantiâ cerebri corticali et glandulosa et cerebello elaborari, sed et in spinali quoque medullâ produci et rationi et aurore immixti afferit.*

3. Concerning another treatise of Monf. DU VERNEY about the fabric of the ear, which was to be soon published.

4. Concerning load-stones, one of which Monf. HEYSIUS saw in the hands of Monf. DU GLUS, which weighing but two drachms, took up two pounds of iron, and which, as the owner affirmed, would take up one hundred and seven times its own weight.

5. Concerning the strange effects of a specular burning glass of two ells in diameter suddenly melting almost all sorts of bodies, and converting others into glass.

The mention of heat occasioned a discourse concerning the effects of cold, particularly the phenomena observed of frozen eggs and apples, that they being put into water would in a short time freeze about themselves a certain shell or crust of ice.

Mr. HENSHAW supposed this to be produced from the particles of cold, which issuing out of the egg or apple, and entering into the water, cause the parts of the

WATER

water to freeze into ice, and so leave the parts of the egg or apple unfrozen.

Mr. Hooke conceived it not to be by any really issuing of particles of cold, but that the egg or apple needing a much greater degree of cold to freeze them than the water, they being already frozen, and so having in them that degree of cold, and the water being yet unfrozen, and having a degree of heat in it enough to keep it unfrozen, they being put together, reduce each other to a middle degree of temper as to heat and cold, which is cold enough to freeze the water into ice, but yet warm enough to leave the egg or apple unfrozen.

Dr. Grew supposed, that it might proceed from the spirituous part contained in the egg or apple; and the water of it, in the water, in the same manner as spirit of wine would remain unfrozen, when water with the same degree of cold would be turned into ice.

But Mr. Hooke supposed, that there was no need of having such a spirituousness as vinous spirits, because there are instances of other bodies, that require much greater degree of cold to freeze them than water, some of which were yet much less spirituous in that kind than water, as a strong brine or solution of salt, and quicksilver, which no cold had been yet found sufficient to congeal; and because there are other bodies more spirituous than water, which yet congeal sooner, as oil of anniseed, which grows hard with a much less degree of cold. He therefore supposed it to be from the particular texture of the body, which might be of a very different nature in other respects from a vinous spirit, and yet might agree with it in this, of being subject to be frozen.

Mr. Hooke produced a globe of about a foot diameter so fitted with an instrument, that he could thereby both geometrically and mechanically draw all the rhomb-lines upon it most exactly: which he explained, and by several experiments proved the truth thereof.

1681, January 4, Sir CHRISTOPHER WREN, president, in the chair:

The minutes of the two preceding meetings were read, and some parts of them discoursed of.

Upon mentioning the phosphorus, the president moved, that a quantity thereof might be procured, in order to make several other experiments with it more exactly for the true nature of its flame, and what affinity it hath with other flame; what effects the presence or absence of the air produces; what part or qualification of it is the cause thereof; how its effects may be increased and diminished, and the like.

Dr. SLARE related, that he had put a piece of his phosphorus in a ring under a red stone.

Mr. HENSHAW mentioned an experiment, which he had seen tried with calcined lead,

lead, that being presently put up into a glass bottle, in order to make an artificial carbuncle, had continued to shine three days; and having been kept therein close stopped from the air for three months, and then opened and exposed upon a board to the air, had taken fire, and burnt the board, upon which it lay.

Mr. HOOKE gave an account of a book, which he had newly procured from Paris, of father DE FONTANEY, a Jesuit, containing his observations and hypothesis of the late comet of 1680 and 1681; together with some discourses about, and censures of the hypotheses of several other writers<sup>7</sup>. This account being long, was reserved for another meeting.

The president moved it, as a thing very desirable to be procured by the Society, on account of the strange effects which it would produce, that a very large burning or specular concave of metal might be forthwith made, in order to make several trials therewith. This was agreed to by several other members, as a thing, that might be of very great use for the farther discovery of the nature and effects of heat, especially for dissolving many things, and calcining of several sorts of bodies.

Mr. ASTON brought in and read an account of Dr. OLAUS RUBBECK's *Atlantica*; as also a letter of thanks, which he had written to the author for his present of that work to the Society.

Dr. GREW produced a paper from Mr. LISTER for the Society, which was read, containing an account of several curious observations made by him about Roman urns found in divers parts of Yorkshire, and other parts of the north: of which urns he had observed three sorts; some of which were very elegantly adorned with basso relievo's, and other marks, which he supposed to be the workmen's names, and not the names of the persons, whose ashes were contained in those urns; for that he had found the same character upon several of them, which were of the same kind and shape and materials. He observed them to differ much from ours in their materials and glazing, for that most of them were not glazed, and others were varnished, as it were, with a bitumen; which he supposed from a passage of PLINY. He remarked, that he had found several places, where the Roman pots were made; one between Wilber-fots and Bombie on the Moor, six miles from York; another at the sand-hills at Santon near Brigg in Lincolnshire; in both which places there were many remains of pots and urns within less than a mile from the Roman road. In the making of those pots and urns the Romans generally used more sand than clay; and they baked them in coffins. Some of these pot-sheerds, which he supposed to be of the same colour with the clay, being now baked again, turned red like our pots<sup>8</sup>.

Mr. LISTER sent likewise to the Society a present of a picture of a remarkable kind of *cornu ammonis*, in his possession, and would have sent the stone itself, if he had had an opportunity.

<sup>7</sup> See Mr. Hooke's Philosophical Collect. No. iv. p. 106. Jan. 10. 1687.

<sup>8</sup> Mr. LISTER's paper is printed in, Mr. Hooke's Philosoph. Collect. No. iv. p. 87.

Dr.

Dr. SLARE shewed a passage in a letter of Monf. M \* \* of Paris, giving an account of a strange tooth, which grew soft in the head after it had been hard ; and afterwards grew hard again ; but soon after fell out.

Mr. HOOKE shewed an engine for describing all manner of helixes upon a cone, which he affirmed to be able to divide any given length, though exceedingly short, into almost any assignable number of given parts ; as for instance, an inch into 100,000 equal parts, and that with the greatest ease and certainty imaginable ; which he conceived to be the best way yet thought of in the world for perfecting all manner of astronomical and geographical instruments.

*January 11,* at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,

Sir JOHN LOWTHER

Dr. WOOD

Mr. PEPYS

Dr. GREW

Mr. HILL

Dr. TYSON

Mr. COLWALL

Mr. HOOKE.

Mr. ASTON

The president having been impowered by former orders to dispose by sale of Chelsea-college with the appurtenances, reported, that he had sold it with the lands belonging to it to Sir STEPHEN FOX for his majesty's use, in case the Council should ratify the said sale, for 1300 *l.* ready money, to be paid by Sir STEPHEN FOX at one payment at the sealing of the conveyances.

The Council hereupon judged, that the president had done a service to the Society, and approved of the said sale at the rate of 1300 *l.* ready money, and returned him thanks accordingly ; and ordered, that the papers relating to the title be lodged in counsellor BAILEY's hands, in order to give satisfaction to the attorney-general.

The President and Mr. HENSHAW were desired to treat and agree with Mr. FRANKLIN concerning the ground of Chelsea-college, and the rent now due.

Mr. HILL having treated with Dr. HORNECK concerning his arrears, being 28 *l.* 19 *s.* and the doctor having proposed to give his bond for 20 *l.* to be paid within half a year, with a request to withdraw from the Society for the future, it was ordered, that the treasurer be desired to agree with the doctor accordingly, and take his bond to himself for the 20 *l.* and to give the doctor a full discharge for the time past.

In pursuance of an order of 22 June 1681, it was ordered, that the treasurer pay Mr. HOOKE the sum of 40 *l.*

At a meeting of the SOCIETY on the same day,

The minutes of the preceding meeting were read, and several parts discoursed of.

Mr. THOMAS CRISP presented a very large branch of white coral, of which several pieces had been broken off; but he preserved most of them, and brought them along with it, and desired, that they might be again fixed on with cement; which was ordered to be done.

Mr. HOOKE brought in a present from RALPH BOX, Esq; of a very large stone, or calculus of a turtle, formed like a bezoar stone.

Mr. LISTER's paper on the antiquities found in Yorkshire being again discoursed of, it was ordered to be registered: upon which occasion Mr. RICHARD WALLER mentioned, that he had found some observations agreeable to those of Mr. LISTER, in a book of JOANNES SMETIUS, intitled, *antiquitates Neomagenes*, printed at Nimeguen in 1678; and to satisfy the Society more fully, he sent for the book itself, and presented it to the Society.

Mr. HOOKE shewed a new instrument, by which he described a certain curve line, which might be called an inverted parabola, or parabolical hyperbola, having these properties, that it is infinite both ways, and hath two asymptotes, as an hyperbola; and that one of the asymptotes being laid upon the axis of a parabola, and upon which occasion lines drawn parallel to it, cutting the parabola and curve, the tangents of the curve are always at right angles with the tangents of the curve. This gave occasion to much discourse concerning some properties of the same; as also, whether it would ever arrive at a certain line drawn upon the cylinder, &c. which Mr. HOOKE affirmed it would never do, though it approached nearer to it every revolution.

January 18, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN, president,
Sir JOHN LOWTHER	Dr. GREW
Mr. HENSHAW	Dr. WOOD
Mr. HILL	Mr. ASTON
Mr. COLWALL	Mr. HOOKE.
Mr. PEPYS	

Mr. FLAMSTEAD was sworn of the Council.

The president gave an account of his proceedings in the disposal of Chelsea-college; for which the Council returned him their thanks, with their earnest request, that he would complete and finish the said undertaking.

Mr. HILL was desired to speak with Mr. EDWIN about depositing the money, when it shall be received, in the East-India company.

The treasurer read over a list of the names of such members, as do not pay at all, or are much in arrears: whereupon he and the two secretaries were desired  
to

to meet the president and Sir JOHN HOSKYNs at the president's house every Monday night; and they were appointed a committee to consider of all matters relating to the arrears, and what expedients were fit to be made use of for the recovery of the same, and to report their proceedings and opinions therein to the Council.

Lr. WOOD reported his proceedings with Mr. SHERIDAN concerning his arrears, viz. that he had propos'd to pay down 10*l* provided he might continue of the Society, and be excus'd from any further payment for the future: which propos'd being debated, was reject'd.

Mr. COLWALL reported the several answers of Mr. HOARE and Dr. MILLES to his demand of their arrears; which were left to be consider'd of by the committee.

Whereupon the president mov'd, that the answers made by several members upon such demands should be register'd in a book, to be produc'd, when the Council should consider of that affair.

An order was pass'd for the payment of Mr. WICKS's salary for one year, ending at Christmas preceding; and it was further order'd, that a stop be put to the salary of the clerk and operator for the future, till the Council shall have farther consider'd and settl'd that affair.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN, president, in the chair:

A letter in Latin from WILHEM TEN RHYNE, dated at Batavia 23 July 1681, and directed to Mr. OLDENBURG<sup>2</sup>, was brought in by Mr. HAAK, and read; in which he desired to be inform'd concerning some affairs in England; and gave an account of some observations, which he had made, and some which he had by him, which he was willing to communicate; of a treatise sent by him to Holland, which he was desirous might be printed in England, concerning the use of moxa, and the *acupunctura* of the Japanese physicians, which he had taken out of their praxis. It was hereupon desired, that Mr. ASTON would make inquiry concerning Mr. TEN RHYNE's kinsman, JOHN GROENVELT; and concerning the treatises mentioned in his letter, whether they could be procur'd; and to write an answer to that letter<sup>3</sup>, in order to see, whether he would continue a correspondence with the Society, though Mr. OLDENBURG were dead.

Mr. TEN RHYNE in his letter remark'd, that moxa was made of artemisia: whereupon Dr. SLARE affirm'd, that he had made a kind of moxa of the fibres of mugwort, being well dried, and the dust blown away.

Mr. HENSHAW was of opinion, that the virtue of the moxa lies only in burning and cauterising; and that the same might be done with any other burning substance; which would discuss the humours, and raise a blister; and that amongst

<sup>2</sup> Letter-Book, Vol. viii. p. 164.

<sup>3</sup> Mr. ASTON's letter, dated January 168 $\frac{1}{2}$ , is insert'd there, p. 187.

several barbarous people the use of firebrands was commonly applied to parts, where any acute pain was felt, as in the head or limbs.

Mr. Hooke was of opinion, that there might be some peculiar virtue in the very substance of the moxa, which might cause this effect, besides the heat and cauterising; which virtue might lie in the solid oil of it, which most vegetables upon burning yield, as tobacco, paper, linen, &c. in which solid oil lies very much of the virtues and qualities of the vegetable substance, which being separated from the salts of vegetables, they were found all alike; and that this only specified them.

The president speaking of the practice of the Chinese physicians observed, that they were extremely curious about feeling the pulse of the patient, examining the beating thereof, not only in the wrist, but in divers other parts of the body; by which they pretended to make great discoveries of the disease. And he was of opinion, that the ancients might know and make more use of the information of the pulse than our modern physicians of Europe; and that there might be more GALEN's curiosity about pulses than was at present understood.

Mr. Hooke was of opinion, that the pulse might discover somewhat of the state of the part, where it was, by means of the stopping of the blood; whether it were in the vein, artery, or muscular flesh, the artery being thereby more strained and extended.

The president conceived, that there might be somewhat even in the motion of the parts of the artery itself; for that it is very visible in dissections in living subjects, that the artery had a peculiar muscular motion of its own distinct from the pulse of the heart; and that by dissecting it appeared plainly made up of three sorts of muscular coats, the innermost of them having long fibres, the outermost round fibres, and the middlemost diagonal or tubical fibres.

Mr. Hooke produced an instrument, and shewed a way of exactly describing the spiral of ARCHIMEDES by a new property thereof, and that with as much ease and exactness, as a circle could be described; whereby not only a given arch might be divided into any number of equal parts, but a strait line given equal to the circumference of the circle.

*January 25,* at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,

Sir JOHN LOWTHER

Dr. CROUNE

Mr. HILL

Dr. GREW

Mr. COLWALL

Mr. FLAMSTEAD

Mr. PEPYS

Mr. ASTON

Mr. HENSHAW

Mr. HOOKE.

Mr. EVELYN

The

The president reported his proceedings relating to Chelsea-college with Mr. BAILEY, Sir STEPHEN FOX, and the attorney general.

It was ordered, that no person whatever, who is a foreigner, shall be admitted fellow of the Society, without a diploma sent to him from the Society.

The president desired, that it might be farther considered, what expedient might be agreed upon for stopping the proceeding in too easy a choice of persons propounded to be elected: and it was proposed, whether the best expedient to prevent the same were not, that after the person should be proposed in the Society, the council at their next meeting should consider, whether he be fitly qualified for promoting the ends of the institution.

And whereas notice had been taken in the council, that several persons had been of late admitted members of the Society without subscribing the bond, and paying their admission-money; to prevent this for the future, it was proposed, that after any any person had passed the ballot, and been declared chosen by the president, the person, who propounded him, shall take care to bring him to the treasurer to pay his admission-money and to sign his bond, and receive an acquittance for the same from the treasurer; which acquittance being shewn to the secretary, the person shall be admitted to write his name in the statute-book, and by the secretary be presented to the president for admission.

These two last orders were to be again debated at the next meeting of the council, in order to be passed into a statute.

It was ordered, that a book of blank bonds be forthwith provided for the treasurer for such persons so to be admitted: and

That the secretaries make trial of some persons for writing between this and the next meeting of the council, and give an account thereof to the next meeting.

Dr. GREW's order brought in by himself was signed.

“ At a meeting of the council of the Royal Society,

“ Dr. GREW having read several lectures before the said Society, of the anatomy of plants, some whereof have been already printed at divers times, and  
 “ some are not printed, together with some others of their colours, tastes,  
 “ and salts; also of the solution of salts, of the waters of this city of London,  
 “ and of mixture; all of them to the good liking and approbation of the said  
 “ Society, it is therefore ordered,

“ That he be desired to cause them to be printed together in one volume:  
 “ and in regard of the great number of figures belonging to them, to take upon  
 “ himself a more particular care of the impression.”

At a meeting of the SOCIETY on the same day,

The president being called away by some urgent occasions, Mr. HENSHAW was desired to take the chair.

The minutes of January 18th were read and discoursed of.

Mr. ASTON gave an account concerning GROENVELT, the physician inquired of in Mr. TEN RHYNE's letter; and he was desired to hasten his answer to that letter.

Mr. HUNT brought in, as a present from Mr. BAGFORD for the repository, a horn or tooth of some strange animal, and the bearded head of an Indian arrow, being made of an hard wood, and bearded with fangs like the sting of a bee or wasp.

Mr. HOUGHTON related, that having spoken with Monsr. GROENVELT, the person mentioned in the letter of WILHEM TEN RHYNE, he had been informed by the said Monsr. GROENVELT, that the said WILHEM TEN RHYNE was physician to the Dutch factory at Batavia, and one of the council there.

Mr. HOOKE shewed a new method of describing a parabola, which on a plain is exactly as a circle by the help of compasses; which method he demonstrated to be geometrically as well as mechanically true: by which means he designed to make a true gage for the forming the shape of the specular concave.

Feb. 1, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the preceding meeting were read.

Part of a letter from Mr. CASWELL to Mr. FLAMSTEAD was read, giving an account of his having lately taken the fall of the river Severn, and found it fall three yards three inches in five miles. The river is indeed swift; and yet Mr. CASWELL was of opinion, that the measure of the fall was too great, though it was taken with a quadrant, and, he thought, very carefully. He mentioned also the height of Rekin hill in Shropshire by levelling down from the top to the Severn river; which height he found to be 396 yards above that river; and the place of the Severn, to which he brought down the measure, he guessed to be 40 yards above the sea. On the top of the Rekin he measured angles of altitude of other hills, whose distance he pretty well knew, by the help of his triangle-work; and he found Sliperitoneclear hill in Shropshire to be 600 yards high; Caradocke hill 490 yards: and for other reasons he guessed the Longment hill to be near 600 yards, and the Brithin, Cavanateller, and Malagolven above 500. These four last he only guessed. He added, that trying the height of Rekin by angles of altitude and distance, he had calculated it to be 30 yards higher than he found it to be by actual measure. Whether this was caused by refraction or unskilfulness of measure and observation, he would not be positive.

A pro-

A propofal of one ROBERT LOWMAN was read, in which he pretended to make all rivers navigable, and defired the council's approbation of his defign. He was called in, and asked, whether he had any thing farther to defire of the Society, or to propound: to which he answered, that he only defired an approbation or recommendation of his propofal, he having a defign thereby to carry up coals to Wincheſter and Salifbury. The vice-preſident told him, that the Society would take time to confider of his request, and give him an answer the next week.

Mr. ASTON read a letter to himſelf from Mr. LISTER.

Dr. SLARE gave an account of ſome farther experiments, which he had made with the new ſhining ſubſtance<sup>a</sup>; which was read; and he produced ſome of the ſubſtance, and a trial thereof was made with ſucceſs in the gallery, which was, that by exhauſting the air, this ſubſtance flamed more.

Mr. HOOKE gave an account of the contents of a letter to Mr. HAAK from a gentleman of Berlin, mentioning, that Dr. ELSHOLTZ hoped, that he ſhould ſoon have the perpetual noſtiluca ſo as to enlighten the whole room, he being already able to read a large print by it: and that provost ANDREW MULLER was ready ſtill to give a ſpecimen of his knowledge in the Chineſe language by the help of a certain clavis invented by him; and that *conſideratis conſiderandis* he would impart his knowledge in that and other curioſities.

Mr. HOOKE produced ſeveral eggs and apples, which had been covered with ſnow and ſalt all the day, in order to try the experiments, which had been formerly propoſed by Mr. HENSHAW, viz. whether two of ſuch frozen eggs or apples being at the ſame time put, the one into a glaſs of cold water, the other into a glaſs of warm, that, which was put into the warm, would not ſooner freeze, and form a cruſt of ice about itſelf, than that, which was put into the cold. But two of them being ſo ordered and ſuffered to lie in the waters about half an hour, neither of them had contracted a cruſt of ice; which was judged to be occaſioned by the warmth of the meeting-room, in which the experiment was tried.

Feb. 8, at a meeting of the COUNCIL were preſent,

	Sir CHRISTOPHER WREN, preſident,
Sir JOHN LOWTHER	Dr. TYSON.
Mr. HILL	Dr. WOOD
Mr. COLWALL	Mr. FLAMSTEAD
Mr. PEPYS	Mr. ASTON
Mr. HENSHAW	Mr. HOOKE
Dr. GREW	

Mr. WILLIAM BAILEY and Mr. NICHOLAS JOHNSON appearing from the attorney general, in order to ſee the conveyance of Chelſea-college and the appertene-

<sup>a</sup> An account concerning a farther proſecution SLARE is printed in Mr. HOOKE's *Philof. Colleft.* of experiments with the phoſphorus by Dr. N°. 5. p. 84.

nances thereof to his majesty, sealed with the common seal of the Society, the council being met, the deed of sale was read over, and the common seal was set to it, the whole council consenting thereto. And at the same time Mr. JOHNSON produced an acquittance to be signed by Mr. HILL the treasurer upon the receipt of the money.

It was ordered, that the 1300 l. now received by the treasurer from Mr. JOHNSON be deposited in the East-India company; and that the obligation from the said company for the same be deposited in the iron chest; and that the keys of the same be in the custody of the persons mentioned in the statutes; and that at the same time the three charters and the common seal be also put into the said chest.

Sir JOHN HOSKYNs was desired to call again upon Mr. BAILEY, and to obtain a copy of the conveyance of Chelsea-college to the king, and to peruse the papers now in the hands of Mr. BAILEY, to see, whether any of them be of farther use to the Society, and not belonging to Chelsea-college, and to bring back such with him, and to leave the rest in Mr. BAILEY's hands.

Mr. HILL returned and brought in a note from COOK and CARY for the payment of 1300 l. to the East-India company; and he was desired to procure the bond of that company for the same upon the Friday following, and to bring it in, that it might be put into the iron chest.

At a meeting of the SOCIETY on the same day, Mr. HENSHAW was desired to take the chair.

The minutes of the preceding meeting were read and discoursed of.

Mr. WICKES brought in a second paper from Mr. ROBERT LOWMAN, wherein he humbly desired, that in case he should meet with some unexpected difficulties in his undertaking, he might have the liberty to crave the Society's direction and advice.

The Society thereupon thought fit to desire Sir JOHN HOSKYNs, Mr. HILL, Mr. ASTON, and Mr. HOOKE to consider of his proposal, and to give him such testimonial, as they should think proper.

The difficulties, which Mr. LISTER had met with in his design of printing a discourse of his about insects, being discoursed of, the Society endeavoured to find out some expedient to have the thing done at their charge, if there could be procured a sufficient number of subscribers to take off such books at a very easy rate, as would pay for the impression. It was thought, that this might be easily effected, if there could be subscriptions enough of the Society to take off fifty copies; and that some care were taken by the secretaries to procure subscriptions from the two universities and their other correspondents to make up the number in all 150, Mr. LISTER having engraven the plates at his own charge, and given them to the Society.

Sir JOSEPH WILLIAMSON acquainted the Society, that the duke of NORFOLK was newly arrived in England.

Upon discoursing farther concerning phosphorus, there were several disputes, whether there were any such thing as *flammula vitæ*: and it was conceived by some, that the experiments of phosphorus plainly proved such a *flammula*, as being extracted either immediately out of the blood, or mediately out of the urine. Mr. HOOKE was of opinion, that there could be nothing proved of that nature by it; for though by a certain preparation, a shining burning substance was extracted from it, yet it was possible, that as a shining and burning substance might be extracted out of other substances not animal; as was particularly proved by the shining of other substances, and particularly lime, formerly mentioned by the president, which was made of that quality by the violence of the fire: and for the quality of burning, he urged, that oil of vitriol and oil of turpentine would produce very strange effects by mixture. He mentioned also an experiment with oil of turpentine and rectified spirit of urine, to shew the strange motion and expansive power of liquors. It was thereupon desired, that he would shew these experiments at the next meeting.

Hereupon was also occasioned a farther discourse concerning the nature of fire, and how consonant experiments were to the theory of the dissolution of bodies by the air as a menstruum.

Part of a letter from Berlin to Mr. HAAK was read \* \* \*

Mr. RICAUT upon occasion of this letter mentioned WERNERUS \* \* \*

Feb. 15, at a meeting of the COUNCIL were present,

	Sir CHRISTOPHER WREN, president,
Mr. CODWALL	Mr. HENSHAW
Mr. HILL	Mr. ASTON
Dr. CROUNE	Mr. HOOKE,

JOHN WILKINSON having been employed by the secretaries in transcribing some papers in prosecution of an order of council of the 25th of January last; and he there producing his writings, they were well approved of; and, it was thereupon ordered, that the treasurer should pay him sixteen shillings for the time past, and eight shillings a week for the time to come, during which he should be employed by the secretaries or either of them, upon his producing a note from either of them for his having been so employed.

The treasurer acquainted the council, that PAUL RICAUT, Esq; has paid his 52 s. on account of his arrears; and that he had been absent out of England for many years. It was ordered, that Mr. RICAUT be discharged of his said arrears to Michaelmas last, he presenting to the library his own printed books, and sealing the usual bond for the time to come.

The

The treasurer brought in the East-India company's bond for 1305 l. 6 s. 8 d. which was put into the chest: and when the bond should be renewed in March following, the word *successors* was to be inserted.

With relation to the collection of money in arrear to the Society,

Mr. RICAUT being applied to by the treasurer, paid fifty two shillings upon his arrears, and excused himself, that he had been many years out of England, declaring, that he would pay for the future.

Mr. WOODROFFE being applied to by the treasurer, alledged, that about seven years before, he had declared to Sir ROBERT SOUTHWELL, that he would withdraw from the Society.

Sir NICHOLAS STEWARD doubted of his arrears being so much as were demanded.

Dr. MILLS and Mr. HOARE being spoken to by Mr. COLWALL, did not refuse to pay, but hoped abatement.

Sir WILLIAM PETTY had ordered his lady to pay ten pounds of his arrears by letter to Dr. WOOD.

The treasurer acquainting the council, that of late years a part of the fee-farm rent of the Society was not answered, by reason that the countess of DORSET had sold away in parts the barony of Lewes; and that what remained in her hands was not sufficient to answer the payment of the said rent; the treasurer and Mr. PACKER were desired to inquire how this fee-farm rent was answered to the king before it was the Society's, and who were then the collectors: as also to inquire of Sir JOHN BANKES, the former owner, and to speak to Mr. GOODWIN, attorney at Lewes, and desire his advice about the best way of proceeding in this affair.

With respect to the arrears, it was ordered,

That Mr. RICAUT be discharged from the payment of more arrears, in consideration of his absence from England, he presenting his books to the library, and sealing the bond for future payment:

That Mr. HOUGHTON be desired to acquaint Dr. WOODROFFE, that the council could take no notice of his withdrawing from the Society, unless it had been formerly done according to the statute, by signifying his desire to the president; and that there was seven years ago a considerable arrear due: that however, because the doctor might believe, that his signification to Sir ROBERT SOUTHWELL might have been sufficient, if he would pay 20 l. to the treasurer, he should be discharged from all arrears, and remain at his own choice, whether he would continue, signing the bond, or recede:

That

That Mr. ASTON be desired to write to Sir NICHOLAS STEWARD, and send him an account of his arrears, Mr. PACKER undertaking to give an answer :

That Mr. ASTON be likewise desired to write to Dr. MILLS and Mr. HOARE, Mr. COLWALL undertaking to obtain their answers : and

That Dr. WOOD be desired to acquaint the lady PETTY, how the money is to be paid, and return thanks to Sir WILLIAM PETTY.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN president in the chair.

The minutes of the preceding meeting were read and discoursed of.

Mr. ASTON read a letter from Mr. LISTER<sup>5</sup>, in which he observed, that the taking off fifty copies of GOEDART was very obliging ; and that he would print it, if he could : but that his own papers were but trifles in consideration of those excellent manuscripts, which Mr. WILLUGHBY had left behind him ; wishing, that the Royal Society would interest themselves in promoting the printing of those manuscripts : that the history of fishes was, to his knowledge, made ready for the press four years before by Mr. RAY, and put into the hand of Mr. CHILD<sup>6</sup>, the merchant in London, who married Mr. WILLUGHBY'S widow, and who had all the rest of his papers : and that it was pity, that Mr. WILLUGHBY'S curious and voluminous observations on insects, in which he greatly delighted, should be lost ; as they probably would, without some such powerful intercession and sollicitation as that of the Royal Society. With this letter Mr. LISTER sent six English turquoises.

Upon reading this letter it was ordered, that inquiry should be made after Mr. WILLUGHBY'S manuscript on fishes ; and Sir JOHN LOWTHER being present undertook to speak to Sir JOSIAH CHILD about it.

Mr. HOOKE was desired to inquire, whether Mr. RAY was in town ; and, if he were, to inquire of him, whether he had any of the philosophical manuscripts of Mr. WILLUGHBY in his hands.

Mr. HAAK produced a paper, which he had received from a correspondent at Berlin, being a catalogue of the writings of ANDREW MULLER, viz. ANDRÆ MULLERI *Griffenbogiæ de Sinenfium rebus aliæque opuscula* :

1. ABDALLÆ *Perfæ historia Sinenfis, Perfæ.*

2. *Eodem Latine cum notis marginalibus edoris et interpretis.*

3. *A bang zweer Reiten die erste eines Moscovitischen Befandten nach Siberien nach China, die Andere HERNE ZACHARIE WAGENERS, durch ein grofs. Theil de Wall und unter en dern auch nach China.*

<sup>5</sup> That dated at York, Feb. 11. 1681, inserted in the letter book vol. viii. p. 177.

<sup>6</sup> Afterwards Sir JOSIAH CHILD.

4. *Commentatio alphabetica de Sinarum Magnaeque Tartariae rebus.*
5. *Basilicon Sinenſe, ſeu Regum & Imperatorum Sinenſium Nomina & res quaedam geſſae ab exordio ad noſtra uſque tempora.*
6. *Imperii Sinarum mappa geographica è mappa ampliffima, quam ipſi dederunt, in anguſtiorẽ formam redacta, & literis Latinis expoſita.*
7. *Imperii Sinarum nomenclator geographicus, prior clafficus, poſterior alphabeticus, tertius Index addendorum.*
8. *Praefationes in hiftoriam Sinenſem, Baſilicam, Commentationem alphabeticam, Nomenclatorem, &c.*
9. *Propoſitiones iuuenti Sinici, Editio quarta cum notis.*
10. *Epiftola de Inſenſu Sinico, cum notis.*
11. *Oratio Dominica Sinicè cum verſione & notis, &c.*
12. *Obſervationis Sinicæ.*
13. *Monumenti Sinici hiftoriae textus, commentarii, &c. antequam nondum editum exam.*
14. *Hiftoria de Sinis ex Armenico Latinè verſa.*
15. *Excerpta de Sinis e Gregorio Maſaſenſe.*
16. *Beſſer unterrichtet vnder Siniſcher Schrift und Drack alſtwa in bern Delie Grob-ritzen unterrichtet vnder Lutheriſchen und Reformirten Kirchen Enballewiff. Accedunt Iter, &c.*
17. *Specimen analyſis literariæ.*
18. *Symbolæ Syriacæ, 1. MOSIS MARDENI & ANDRÆ MASII Epiftolæ Syriacæ cum Verſione & Notis. 2. Diſſertationes, 1. de MOSE MARDINO, 2. de Syriacis ſacrae Scripturae Verſionibus.*
19. *Commentarius de perantiquo Pentateuchi Hebraici manuſcripto, quod anno CHRISTI 334 in inſula Rhodo ſcriptum eſt, jamque in Bibliotheca Electorali aſſervatur.*
20. *Actio Plagii Literarii Sinenſis, &c.*
21. *Specimen chronologicum.*
22. *Specimen . . . . Mandarinici.*
23. *Index generalis Autorum rerumque, &c.*
24. *Catalogus Opuſculorum ab Autore baſſenus editorum & ineditorum.*
25. *Elenctus Librorum rariorum tam manuſcriptorum quam editorum pro Em-  
poribus.*

Mr. ASTON read a letter\*, which he had written to Signor MALPIGHI, to re-  
turn him the Society's thanks for his picture and preſent of books.

Mr. ASTON preſented from Mr. THOMAS MORRIS of Weſtmiſter a manuſcript  
of PAULUS OROSIUS.

Dr. WOOD preſented Monſ. DES CARTES's works, viz. 1. *Principa & Spec-  
mina*, Amſtelod. 1664. 2. *Meditationes*, ibid. 1663. 3. *Geometria*, 2 volumes,  
ibid. 4. *De Homine*, Lugd. 1664. 5. *Lettres*, 3 volumes, Paris 1657: as alſo  
MERSENNUS's *Cogitata Phyſico-Mathematica*, Paris 1664.

Dr. SLARE preſented the Society with a ball taken out of the ſtomach of an Alpine

\* Letter book, vol. viii. p. 191.

goat,

goat, given him by Mr. FRY, an apothecary, who had taken it out of the animal.

He shewed a strange sort of rice shaped like a clutched fist, and said to grow in Morocco.

Mr. HOOKE shewed the two experiments, which had been ordered at the last meeting, 1. The moving of oil of turpentine upon spirit of wine. In the first trial in highly-rectified spirit of wine, the turpentine sunk; but in brandy it succeeded well, and exhibited a great variety of motions.

2. The mixture of oil of vitriol with oil of turpentine, which grew very hot, and swelled much, as was expected, but not so much as had happened in several other trials.

The president being now present, and Mr. FLAMSTEAD having cavilled against the method shewn by Mr. HOOKE of describing a parabola, and affirming it to be false, the Society desired Mr. HOOKE to shew again the way, which he had demonstrated at the last meeting: and which he now repeated, and demonstrated the ground thereof. Upon which the president declared to the Society, that it was true and certain, and the best way yet known of describing that curve, and never published before.

February 22, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs vice-president,

Mr. HENSHAW

Dr. GREW

Mr. COLWALL

Dr. TYSON

Mr. HILL

Mr. FLAMSTEAD

Mr. PEPYS

Mr. HOOKE.

Mr. HOOKE, in prosecution of the desire of the Council, having attended Sir WILLIAM JONES with the state of the case concerning the arrears due to the Society from several members, produced Sir WILLIAM's opinion thereupon as follows:

" The king by his charter grants to the president and council of the Royal Society power to make such by-laws, as they shall think fit for the government of the Society; which he enjoins and commands to be inviolably observed, so as they be reasonable, and not repugnant to the laws and statutes of this kingdom.

" They make a by-law or statute, that every fellow pay one shilling a week for defraying the charges and expences of the Society.

" Every member at his admission does subscribe a promise or engagement, that he will observe the statutes and orders of the Society, and has notice of this statute.

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S

" Many

“ Many Fellows in arrears.

“ Qu. Whether these arrears are reasonable ? how ? and by what action, and for what time back ?

“ I think an action may be brought for the recovery of the arrears ; and it is not material in the cause, whether the laws be confirmed by the chancellor, chief justice, &c. And the action to be brought must be an action of debt in the name of the corporation. It will be best to bring it for the whole arrears, and let the defendant plead the statute of limitation to all but six years, if he shall think fit. Perhaps some will think it a dishonour to do it : however it will be a bar but for what is above six years.

“ WILLIAM JONES.”

Mr. HILL reported, that Mr. HOAR had paid his arrears due upon bond, viz. eight pounds nine shillings, and taken up his bond, and desired to be discharged from the Society for the future : to which purpose he would write to the president : but that the said Mr. HOAR still owed upon the old arrears twenty pounds sixteen shillings.

Mr. HILL reported also, that Dr. MILLER had refused to pay his arrears, though due upon bond, amounting to 7l. 16s. Whereupon after a debate it was thought fit, in respect to the person, that a letter should be written to him, to acquaint him with the resolution of the Society to put his bond in suit, and to press him to pay, or give his positive answer.

Mr. HILL reported concerning Mr. STANHOPE, that he had some years before paid to the society 16l. and desired to be discharged at that time from the Society. Whereupon it was ordered, that the account should be examined and reported to the council.

He reported the answer of Mr. EDMUND WALLER as follows : Mr. WALLER said, that the plague happening some time after the Society was established, and he being perpetually in parliament had never been able to attend the Society, either to serve them, or receive any advantage thereby : that he was now of a great age, had lost half his fortune for the king, and having a great charge of children, hoped, that he should be considered as others, who had not been able to wait on them as well as he : and he humbly took leave to consider how he might be able to serve them.

Mr. HOUGHTON brought in an account of his success in collecting arrears :

That he had been four times to find Sir NICHOLAS SLANING, and that he was now gone into the country :

That Mr. HOAR had paid his arrears on bond, and desired to be excused from attending on the Society for the future :

That

That Dr. CLENCH readily paid his arrears, and was willing to do any thing, that should be for the Society's service for the future.

Mr. HOUGHTON being desired, promised to deliver in writing the rest of the answers, which he had received.

The council desired, that inquiry should be made concerning the decease of several members, and the time of it; as of the Lord BRERETON, Mr. BARRINGTON, Mr. HOAR, junior, Sir KINGSMILL LUCY, Sir JONAS MOORE, senior, the lord Viscount STAFFORD, and Sir JOHN WILLIAMS; and likewise, who were the executors or persons liable to pay their debts, in order to the procuring their respective arrears due to the Society.

It was resolved, that the case of Signor SAROTTI, Mons. SPANHEIM, and some other foreigners, with relation to their payments, be debated at the next meeting of the council.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair:

The minutes of the preceding meeting were read.

The turquoise-stones mentioned in a letter of Mr. LISTER read at the last meeting were now produced; some of which being broken appeared of a very curious blue like lapis lazuli. It was desired, that some of them should be tried by a lapidary, and by some other means, to find out the true nature of them.

Mr. DACRES presented by Mr. HOUGHTON a parcel of cuttings of a leaf, supposed from the smell and taste not to be tobacco, but of some other plant, wrapped up in a roll of plantain leaf, which is used by lighting it at one end, and applying the other end to the mouth, and drawing the smoke through it.

Mr. HOOKE presented some papers given him by Mr. ARNOLDUS of Nuremberg, viz.

1. A representation of the appearance of the comet, as it was observed there by Mr. EY MART, and printed upon blue paper with the hightening of the lights of it by a white laid on, as was supposed, with a pencil.
2. A representation of the view of the inside of a church in Nuremberg in rebuilding, made by ANDREAS GRAFFEN.
3. A taille douce made by SUSANNA MARIA SANDRACTINA, after a painting of PIETRO BERETTINI of Certona.
4. A map of the country of Venezela given by the Emperor CHARLES V. to the noble family of the VELSER's of Augsburgh.

Mr. Hooke likewise shewed a draught of a sextant made by Mr. Eymart for making observations of the late comet.

The experiments of phosphorus were shewed by Dr. SLARE, viz. some pieces of that shining substance exalted to a much greater perfection; with which experiments the Society was very well pleased, especially the Earl of AYLESBURY, the Lord CAVENDISH, and Mons. JUSTEL, who had not seen the like.

*March 1*, Sir JOHN HOSKYNs vice-president in the chair:

The minutes of the last meeting were read.

Mr. ASTON gave an account, that Dr. BROWN with some other physicians had dissected an ostrich; and had drawn up an account of his observations made in that dissection, which he now communicated to the Society; and it was accordingly read.

Mr. Hooke produced a long letter from Mr. LEEWENHOECK, containing an account of several curious observations and discoveries made with a microscope by himself. The letter being in Low Dutch was not read; but Mr. Hooke having translated half of it read it to the Society, wherein was an account of several curious discoveries relating to the fibrils, hair or small claws of muscles. He promised to translate the remaining part of this letter against the next meeting.

Mr. HOUGHTON shewed a very curious piece of turned work, viz. a double branched candle-stick of box, with sixteen branches all glewed together upon a stock in two rows one above the other, and so ordered with a globe of glass with a small arch, as almost to fill the whole cavity of the globe: of which Mr. HUNT was ordered to make a small draught to be inserted in the register-book.

Mr. HOUGHTON brought in also a piece of white marble stained red, and half a large bladder supposed to be the crop of a pelican; both which were given him for the repository by Mr. SMITH of Christ-Church.

Mr. Hooke shewed a way of describing all varieties of ellipses by a new sort of compasses invented by himself, in which he made use of the same instrument, with which he described the parabola and spirals.

*March 8*, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,

Mr. HILL  
Mr. COLWALL  
Mr. PACKER  
Mr. PEYNS

Dr. GREW  
Mr. ASTON  
Mr. HOOKE.

\* It is printed in Mr. Hooke's *Philos. Collect.*      \* Ibid. p. 152.  
N<sup>o</sup>. 5. p. 147.

The opinion of Sir WILLIAM JONES concerning the way of recovering the Society's arrears was again read.

The several answers of Mr. HOAR, Dr. MILLES, Mr. STANHOPE, Mr. WALLER, Sir NICHOLAS SLANING, Mr. LE HUNT, Sir JAMES SHAEN, Dr. THOMAS COX, Capt WYNDE, Dr. CLENCH, Dr. CHAMBERLAYNE, Dr. ALLEN, and Dr. KING were reported by Mr. HOUGHTON.

Upon debating the answer of Mr. HOAR, it was ordered, that he should from henceforth be left out of the treasurer's books, and out of the list of the Society.

Upon the debating of Dr. MILLES's answer, it was ordered, that Mr. HOUGHTON should go with another letter from the secretary, and press him for a positive answer to the same.

Mr. STANHOPE's answer being debated, it was ordered, that he should be left out of the treasurer's book, and out of the list of the Society, for the future; he now acknowledging, that he gave notice to be so left out of the Society, when he paid his last arrears.

Mr. EDMUND WALLER's answer being read, it was ordered, that Mr. HOUGHTON should again attend Mr. WALLER, and see to get what he can of his arrears, and make as good a composition with him as possible.

Concerning Sir NICHOLAS SLANING, it was ordered, that there should be a letter of demand sent to him into Cornwall; and that the leaving him out of the Society should be for some time suspended: and that the secretary should in some part of the letter intimate, that the Society designs to take out of their body, the names of those, who should remain in arrear.

Mr. HOUGHTON was desired to call again upon Sir JAMES SHAEN, and if he would pay twenty pounds, to deliver up to him his bond: as also to call again upon Dr. COX, and acquaint him, that the arrears due from him were due upon his bond.

Mr. HOUGHTON was desired to inform himself concerning the time of the death of Sir JONAS MOORE, senior, Sir KINGSMILL LUCY, and of other members.

Signor SAROTTI, Monsr. SPANHEIM, Dr. HUISE, and Dr. PAPIN were ordered to be left out of the treasurer's book, but not out of the Society, but to be as honorary members.

Mr. PACKER reported the answer of Sir NICHOLAS STEWARD, that he was willing to pay ten pounds, and desired to be discharged from the Society for the future. Whereupon it was ordered and desired, that the treasurer and Dr. CROUNE should write to him, and put him in mind of his former promise of paying his arrears.

arrears to the Society; and of procuring his son to be admitted of the Society to succeed him.

Mr. HOUGHTON reported Capt. WYNDE's answer, that he would speak with the president about his arrears; and it was respite'd till he had so done.

He reported also Dr. ALLEN's answer: to which he was desired to return this message from the Society, that the Society expected and demanded the full arrears due upon bond; and that they would discourse with him afterwards concerning the other arrears.

Mr. HILL reported the answer of Dr. KING, that he having made several experiments, and brought in the accounts of them to the Society, conceived, that they might balance his old arrears: which being debated, it was order'd, that in consideration of his trouble and charges, and of the accounts brought in, as was alledged, the said Dr. KING should be discharged of all his old arrears due to the Society before he gave his bond.

Mr. PACKER gave an account of his inquiry concerning the way of collecting the fee-farm rent; and he was desired to continue his care to be farther informed about that affair, and to report his success to the council.

Mr. ASTON read a letter from Dr. BATHURST, containing many expressions of respect and kindness to the Society, and that he designed to send them ten pounds; and that he had bequeathed more to them in his will.

Mr. ASTON read also a letter from Dr. PLOT, giving an account of his solicitations of Dr. CLARKE, Dr. BATHURST, and Mr. SMITH, viz. that Dr. CLARKE was dangerously sick; that Dr. BATHURST and Mr. SMITH hoped, that they should not be oblig'd to the weekly contributions. But that Dr. BATHURST would speedily present to the Society ten pounds; and that Mr. SMITH would also present them with somewhat considerable.

It was order'd, that Dr. THRUSTON be left out of the treasurer's book and out of the list of the Society for the future.

Upon debate concerning the manner of cancelling the names of such, as should be left out of the Society's lists for the future, it was agreed, that it should be done by placing a cross before the name, with the time, when it was so cancelled.

Mr. HILL read a letter from Sir ROBERT SOUTHWELL desiring to be accommodated with some of the things in the repository, of which there were duplicates. Whereupon it was order'd, that he should be so accommodated; and it was referred to Dr. GREW to examine the particulars laid aside for him; and to take an account thereof; and that they be delivered to such person, as Sir ROBERT SOUTHWELL should send for them.

Mr. HOUGHTON brought in answer from Mr. MOXON in writing, which was read, but the debate of it was respite to the next meeting, it being late.

At a meeting of the SOCIETY on the same day :

The president and vice-president being absent, Mr. HILL the treasurer was desired to take the chair.

The minutes of the preceding meeting were read, and some parts discoursed of.

Mr. HOOKE brought in the translation of Mr. LEEWENHOOECK's letter, which he read and explained some parts of it, and gave an account of what observations he had himself formerly made about the fibrils of muscles, their smallness, and form much like a chain of beads or a necklace of pearl; and he remarked, that he had several times written to Mr. LEEWENHOOECK to desire him to inquire farther concerning the nature of muscles.

Mr. HOOKE was desired to answer this letter of Mr. LEEWENHOOECK, and to send him the *Philosophical Collections*, that had been printed, and to publish this letter in the next *Collection*.

Mr. CLUVERUS's account of three tracts or relations concerning the nature and effects and theory of comets (shewn to the Society by Mr. ASHMOLZ, and which, by reason they were printed in the German tongue, were recommended to the perusal of Mr. CLUVERUS) was read. He promised also to bring in an account concerning another tract referred to him for his perusal.

A letter of Mr. HEVELIUS to Mr. CLUVERUS was read; whereupon it was desired, that when an answer should be sent him, the *Philosophical Collections* should be sent with it.

Dr. GALE brought in a letter to himself from Mr. HEVELIUS, dated at Dantzick 17 January, 1681 N. S.<sup>a</sup> concerning a comet and the occultation of palæcium or bulls eye by the moon; which was read.

Dr. GALE produced also other letters to himself, viz. 1. from Dr. BOHN of Leipzig, dated there 15 July, 1681<sup>b</sup>, intimating his design of sending over some papers, and desiring to know the Society's judgment about the Clauderian embalming.

2. From professor STURMIUS of Altorf, dated there 10 February, 1681<sup>c</sup>, giving notice of the observatory to be erected at Nuremberg.

3. From Dr. BOHN of January 8, 1681, containing a draught of a monstrous female foetus.

These letters were ordered to be perused again at the next meeting.

<sup>a</sup> Letter book, vol. viii. p. 151.

<sup>b</sup> Ibid. p. 163.

<sup>c</sup> Ibid. p. 155.

The extremely small stringy parts of the muscles of a lobster were shewn by Mr. HOOKE in a microscope; whereby it appeared, that these filaments of muscles were not more than the tenth part of the diameter of the hair of one's head.

March 15, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN, president,

Sir JOHN LOWTHER

Dr. GREW

Mr. HILL

Dr. WOOD

Mr. COLWALL

Mr. ASTON

Dr. GALE

Mr. HOOKE.

It was ordered, that the treasurer pay fifty shillings for Mr. LISTER's 50 books; and that Mr. HUNT receive one shilling for each upon delivering them, and repay the treasurer: and

That a letter be written to Dr. PARKER by Mr. ASTON; and that if no answer be returned, there be some farther application made to him by some friend.

At a meeting of the SOCIETY on the same day, the president being absent, Mr. HILL the treasurer was desired to take the chair.

Mr. ASTON read a letter to himself from Mr. LISTER, dated at York 4 March, 1681<sup>1</sup>, mentioning, that he had sent up fifty small books, intitled *appendix ad historie animalium anglie tres tractatus, &c. continens addenda & emendenda*, of which 150 copies only had been printed at his own expence; the said fifty copies to be disposed of amongst the members of the Society at one shilling each. He mentioned likewise, that he had sent a black muscle rarely to be met with in England except in the river Tees, and a piece of a rock perforated by the pholades of the sea.

Mr. ASTON read a paper of WILLIAM BRIGGS, M. D. concerning a new theory of vision<sup>2</sup>, explaining the cause, why, though the picture of the object be made in both eyes, and so be seen by both, yet the imagination forms but one idea, which he conceived to be an harmonious tension of corresponding fibres of the optic nerve.

Some objections were made about the tension of such fibres; but because the debating thereof would have been too long for the present meeting, it was referred to another.

Mr. ASTON read a proposal of Dr. GREW for publishing by subscription in folio an edition of all his writings, except his *Magna Regalis Societatis*; which design was well approved of, and subscribed to by several present.

<sup>1</sup> Letter book, vol. viii. p. 179.

N<sup>o</sup>. vi. p. 127. for March 1681.

<sup>2</sup> It is printed in Mr. HOOKE's *Philos. C. III.*

Mr. HOOKE

Mr. HOOKE exhibited an experiment to shew, that the heat of the fire was not propagated in the same manner as the heat of the sun; for that a plain looking-glass plate being put between the concave metal and the fire, though it seemed very little to hinder the propagation of light, yet it took off almost all the heat in the focus of the concave; as was experimented by several there present, and particularly by a nobleman of Savoy introduced by Sir THEODORE DE VAUX.

Dr. SLARE, for the entertainment of the strangers, shewed some experiments with his phosphorus, which he had formerly shewn to the Society.

March 22, the president being absent, Mr. EVELYN was desired to take the chair.

The minutes of the preceding meeting were read and discoursed of.

Mr. ASTON read a letter from Dr. BATHURST in answer to one from Mr. ASTON about his arrears to the Society; in which letter the doctor sent a bill of ten pounds to be paid to the treasurer.

Mr. ASTON read an extract of a letter in Latin to Mr. HAAK from Monf. HEYSINS<sup>m</sup>, containing observations made with the thermometer, and on the magnet, and the porosity of gold and silver.

Much discourse was occasioned hereby about the colours of glass.

Dr. TYSON shewed in the eyes of sheep those particulars, which were mentioned in Dr. BRIGGS's *New theory of vision*, read at the last meeting.

Mr. HOOKE brought in Mr. LISTER's present for the repository of the shells of a very large thick river muscle, and a stone all over incrustated, wherein were some kinds of worms.

Mr. HOUGHTON presented for the repository a piece of coarse \*\*\* cloth, affirmed to be made of materials very different from flax, hemp, cotton, &c. as also two lumps of a kind of brass said to be taken from the Guinea gold in the Indians refining of it, and commonly known by the name of Guinea drops.

Dr. SLARE brought in from Mr. MELLING the scorpion, which he had formerly shewn to the Society alive, now well preserved in spirit of wine in a glass sealed up hermetically.

Mr. HILL presented from Sir ROBERT SOUTHWELL four pieces of amber, which were very extraordinary; one contained a very large spider; the second contained a kind of moth or small fly; the third divers small flies; the fourth  
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<sup>m</sup> Letter book, vol. viii. p. 192.

*March 29,* the president being absent, Sir JOSEPH WILLIAMSON was desired to take the chair.

The minutes of the preceding meeting were read and discoursed of.

Mr. HOOKE read a letter to himself from Mr. LISTER, dated at York 21 *March, 1681*\*, giving an account of a patient of his, who had for about the space of four months been troubled with great pains, and sometimes with horrors and chilliness, and at last with a most violent vomiting, with which he cast up a great quantity of blood; and in that a strange creature, the shape of which was particularly described by him in words and by a figure, and thereby shewn to be different from that of any other creature ever seen by him. He endeavoured to give some probable conjectures at the cause of the monstrous production, supposing it to have been generated out of some feminal water swallowed in pond-water, which he often drank, when wearied with labour in his employment, which was that of a baker. The strangeness of this relation, with the attestation of it by Mr. LISTER, as it pleased the Society, so it occasioned much discourse concerning the reason of such strange kinds of monstrous productions; and several other instances of the like nature were related on this occasion; as Mr. HOUGHTON mentioned an acquaintance of his, a barber in the Old Jewry, who for many years past voided pieces of the cucurbitive worm, sometimes two or three yards at a time: that he had taken all the medicines, which he could imagine, even to a considerable quantity of sublimate itself, being almost careless of his own life; and yet was not able to free himself from that distemper. He also mentioned another person, who had voided one of these worms, which had 507 joints; and was in all seven yards and three quarters long; which worm was yet to be seen preserved.

Dr. SLARE related an observation, which he had made of a like worm vomited up by a cat.

Mr. ASTON was of opinion, that those kinds of worms might proceed from some other causes than those mentioned by Mr. LISTER; and mentioned two instances, that he conceived to favour his conjectures, which were some observations, that had lately been made of worms of a considerable size, found in the kidneys; one whereof had eat out all the parenchyma of the kidney, and left nothing but a skin or bladder. He therefore queried, how the feminal principle could pass all those narrow passages and digestions, which it must do before it arrived at the kidney, and yet keep its feminal principle alive. To this there were several answers made, and arguments alledged for the method of explaining mentioned by Mr. LISTER.

Mr. HOOKE read an account, which he had received from Mr. HALLEY, of an occultation of the bull's eye by the moon, which had been observed 28 Oct. 1680, at Ballasore in the East Indies by Mr. BENJAMIN HARRY, master of the ship Berkley Castle; by which it appeared, that the Dutch maps of the East In-

\* Letter-book, Vol. viii. p. 164. It is printed in Mr. HOOKE's *Philosoph. Collect.* No. 6. p. 641: dies

dies are no less than 13 degrees false in their longitudes, and the French maps of Monf. SANSON no less than 18 whole degrees.

The third paper of Mr. CLUVERUS was read, giving an account of another treatise about the late comet; which being printed in High Dutch, he had been desired to peruse.

There was another paper, which Mr. HOOKE would have read, *viz.* his translation of an account of the discovery to the southward of Nova Hollandia in the East Indies in the year 1643, extracted out of the journal of captain ABEL JANSEN TASMAN, and published in Low Dutch by DIRK REMBRANTSE; but this account<sup>a</sup> being somewhat long, it was deferred. However, Mr. HOOKE moved, that the Society would take care to collect all such voyages, as had been already published, or that could by any other ways be procured. Whereupon it was desired, that Mr. HILL and Mr. HOOKE would endeavour to procure and buy as many of that kind, as they should meet with, for the use of the Society, and bring in an account of the expence to the council.

*April 5,* the president in the chair :

The minutes of the preceding meeting were read and discoursed of.

Mr. HOOKE read a second letter, which he had received from Mr. LISTER dated at York April 4. 1682, adding this further observation concerning the man, who vomited a worm, that he was then perfectly recovered; and that this fact had brought into his memory many others, which had happened in those parts, but so strange and so imperfectly related, that he could not venture to mention any of them.

Upon this occasion the question concerning the generation of these strange creatures within the body of man was again discoursed of; and the strangeness of their shape caused some of the members to doubt, whether this creature was ever really alive; and whether, if so, it could be produced from the previous seed of any other creature, especially because of its shape and magnitude so different from those of any other creature. But it was agreed, that the particular quality of the place, in which seed had been fostered, *viz.* the stomach and guts of a man, might cause that seed, whatever it were, whether of a toad, frog, or some insect, to grow thus monstrous; to which cause might be ascribed the monstrosity of divers other strange births.

This occasioned a farther discourse about the various and strange manners of the productions of insects; and it was again urged, that the papers of Mr. WILLUGHBY, formerly mentioned, should be procured for the Society, if possible. Mr. HILL informed the Society, that they were left in Warwickshire; and that if Mr. RAY should be desired to look them out, they might be had for

<sup>a</sup> It is printed in Mr. HOOKE's Philosoph. Collect. No. 6. p. 179.

the Society. Sir JOHN LOWTHER affirmed, that Sir JOSIAH CHILD was willing to deliver them to the Society.

The president gave an account of the writings of Dr WIERD, which the Society had desired him to peruse, viz. that the said doctor had been very diligent and curious in observing the figure, quality, refraction, &c. of the parts of the eye, and had many very good observations and conclusions thereupon; but that in relating he was somewhat too prolix and particular, and owns, that he set them down for his own memory; and therefore that it were very desirable, that the said writings might be recommended to some knowing and judicious person in the study of anatomy, geometry and optics, to peruse the same, and make an abstract of whatever was necessary and pertinent, and to leave out such other things, as should be judged otherwise; and that being done, to procure it to be printed and published in the doctor's name.

Mr. ASTON read a letter from Dr. SIBELIUS dated at Amsterdam, giving an account, that he had sent the discourse of Dr. WILHEM TEN RHYNE, formerly mentioned, to Dr. GROENVELT; and Mr. ASTON added, that Dr. GROENVELT had received it, and promised to bring it that afternoon to the Society; but that Mr. HOUGHTON, who had undertaken to bring it, was gone out of town.

Mr. HOOKE read a letter\*, which he had sent to Mr. LEEWENHOECK concerning the discoveries, which he had made and shewn the Society four or five years before of the figure of the fibrills of the muscles of crabs, lobsters and shrimps, &c. viz. that they in appearance through a microscope resembled a necklace of seed pearl; and that every one of those fibrills, which was not much above a hundredth part of the bigness of an hair, seemed to be distinct strings of pearls or bullets; and that the whole bulk of the fleshy part of those muscles was made up of an infinite number of those fibrills lying parallel by one another; but that he had not hitherto been able to see that figure in the fibrills of the muscles of the flesh.

He also read a letter from Mr. LEEWENHOECK in answer to the same, dated at Delft 4 April, 1682, N. S.<sup>a</sup>. giving an account, that he had at the desire of Mr. HOOKE viewed the muscles of crabs and shrimps, and had found the same appearance; but that he had discovered them to be of the same nature with the ripples in the fibrills of flesh-muscles; and to be composed of other less fibrills, as are those of flesh.

The president gave an account of Signor BORELLI's book *De motu musculorum*, perused by him, viz. that the author had been very elaborate and ingenious in his inquiries into that subject; but seemed to be very much mistaken in several things asserted by him, and particularly in the motion of a horse, and in the strength of the motion of a muscle; for that, according to his calculation of the strength, it was impossible, that the tendons of several muscles could sustain such a force, though they should be as strong as a piece of iron of the same bigness.

\* See Mr. HOOKE's Philosoph. Collect. No. 7. p. 189.

\* Ibid. p. 182.

Mr.

Mr. HILL desired, that the former letter sent to Mr. LEEWENHOECK might be likewise read; but Mr. HOOKE not knowing whether he had any copy of it, Sir JOSEPH WILLIAMSON and Mr. HILL were very urgent to have all papers entered into books. The Society thereupon thinking it a matter not so proper to be discoursed of at these meetings, desired, that it should be recommended to the council to consider of it at their next meeting.

Mr. HOOKE read a letter, which he had received from Mr. WILLIAM MORGAN, his majesty's cosmographer, signifying his respect to the Society, which had caused him to send them a present of his new map of London, Westminster, Southwark, and all the adjacent suburbs, desiring their approbation of it; and that they would be favourable in their censures of what they might find not so perfect, as could be wished; and that they would give it their good word, which would be a great encouragement. The Society desired, that their thanks might be returned to him for his map, and that there might be some favourable character given of it in the Collections of this month.

The shape and structure of the fibrills of the muscles of a lobster were shewn in a microscope by Mr. HOOKE; and plainly seen by several of the members present, who had had some doubts of the truth of the appearance, as having not been able at other times to discern them.

*April 12*, Sir CHRISTOPHER WREN president in the chair:

The minutes of *April 5* were read; and upon occasion of those concerning the transformation of creatures by means of the qualifications of the place, wherein they are fostered, the president related, that he had observed in a garden made out of the ruins of an old building, that the leaves of all the plants became speckled and striped; and that the same plants being transplanted from thence to another place would for some time continue striped and speckled. The change effected in mules and in the redstreak fruit was also mentioned. It was likewise urged, that there are many of the Jews black, who yet are very strict in not mingling with other nations; and that Europeans, by continuing to inhabit in Africa, have been found to turn black, and that Blacks in England, after a few generations, become white: and that wild asparagus, which is very small and sticky, being planted in gardens, and heightened with dung, become large and soft.

Mr. ASTON read a letter to himself from Signor MALPIGHI, dated at Bologna 1 *April*, 1682, giving an account, that LAURENCE BELLINI's medical works were printing there, in which he explained a course of physic by mechanical principles in a mathematical method: That BORELLI's posthumous works were published; and that father BARTOLI a Jesuit had published a book on freezing and ice.

\* There is nothing said of it in Mr. HOOKE'S Philosoph. Collections, No. 7. for April 1682.

the last, which he published.

\* Letter-book. Vol. viii p. 203.

Mr.

Mr. HAAK presented a small tract, which he had newly received from Leipzig, intitled, *Alta eruditorum publicata Lipsiæ calendis Januarii, anno MDCLXXXII.* it being the first of that kind, which had been there published, the author thereof designing to continue the publication of them every month. It contained an account, 1. Of Dr. GREW's *Museum Regalis Societatis.* 2. Of *Sacrum Anticbenum Concilium*, published by Dr. EMANUEL à SCHELSTRATEN, canon of Antwerp. 3. Of ZIALOWSKI's *Brevis delineatio Ecclesiæ Orientalis Græcæ.* 4. Of the Chevalier LEWIS DU MAY's *Prudent Voyageur.* 5. Of a treatise, intitled, *Traité du Droit de Chasse.* 6. Of Dr. TYSON's *Anatomy of a porpoise.* 7. Of BLASIVS's *Anatome Animalium.* 8. Of Dr. BATES's *Vite selectiorum aliquot virorum.* 9. Of HENRY VALESIVS's edition of *Annius Marcellinus.* 10. Of ABRAHAM MUNTINGIUS's book *De verâ antiquorum verbâ Britannicâ.* 11. Of Mont. GRELOT's *Relation nouvelle d'un voyage de Constantinople.* 12. Of SCHERZER's *Anti-Bellarminus.* 13. Of *Observationes quædam anatomice.* 14. Of a new way of doubling an equilateral triangle, by Father COLPITIUS. 15. Of HEVELIUS's observations on an eclipse of the moon 29 Aug. 1681.

Mr. HAAK remarked, that the said Father COLPITIUS had about four years since published a large book of mechanics; but that it had not yet been brought into England; but that he, Mr. HAAK, had sent for it, as also for such other of these monthly *Alta Eruditorum*, as had been since published at Leipzig.

Mr. HOOKE gave an account of a voyage made by the Dutch in the year 1643 to the south of Nova Hollandia, shewing the way, which they had taken upon the globe, together with an account of the most considerable remarks, which they had made on the variation of the needle, the hollowness of the sea, and the nature of the countries.

He also shewed in a microscope a very curious sort of sand, brought out of Italy, and different in shape from all the other sand ever seen by him, being very fine and white, and yet all the grains thereof were of some round or oval figure, and none angular, as all the sand in England is.

He shewed likewise part of a flesh muscle in a microscope; but the ripples mentioned by Mr. LEEWENHOECK could not be discovered, though examined by a very good microscope.

Dr. WALLIS presented the Society with a copy of PROLEMY's Harmonics, published by himself at Oxford: and the president desiring him, that he would further enrich the Society with all the rest of his works, he promised to do it.

Mr. HOUGHTON presented a small book of Dr. EDWARD WILSON, intitled, *Spasacrena Dunelmensis.*

The president moved, that some experiments might be made about the strength of timber and iron.

April 19. The president being absent, Sir JOSEPH WILLIAMSON was desired to take the chair. The

The minutes of the preceding meeting were read : after which the subject formerly discoursed of concerning the alteration of the form of animal bodies, by the variety of food, climate, soil, and usage, was again debated, and several arguments alledged for and against the opinion.

Mr. ASTON by the way remarked, that he had seen an he ass in Spain seventeen hands high.

Mr. HILL said, that he had been told by Mr. COLWALL, that a Black, who had had the small pox in England, grew afterwards white.

It was conceived by some, that the cuticula might be somewhat of the nature of hair, nails, horns, &c. and that there might be various changes effected by art in each of them.

Mr. HOOKE mentioned the way of making a white star in the forehead of a horse by scalding out the old hair, or some other way making alteration there : That it is generally affirmed, that the plucking out hairs or feathers by the roots will make the hairs or feathers, that grow anew, to become white : That from the texture, which he had observed in a porcupine's quill, he conceived, that the texture of some sorts of hairs might be \* \*.

Dr. PLOT observed, that there were several parts in England, as in Oxfordshire, Staffordshire, &c. where sheep have four, others six, others eight, and some twelve horns all at once : That the gelding of bulls makes their horns grow larger ; but that the gelding of rams makes them grow less : That the gelding of a buck, when the horns were on, would make them never shed ; but that when the horns were off, they would never grow again : That sheep in Dorsetshire have exceedingly great horns, but in several other places none at all.

Mr. HILL mentioned, that he had been informed by Mr. CHETWYND, that the Lord FERRERS, upon destroying a warren in his park, found, that his deer lost their horned heads.

Dr. PLOT confirmed this, having seen the said deer, which, he said, were very large, and fair, but had no horned heads. But he remarked, that the reason was the want of burrows.

He related also, that at Clarendon the contrary had happened, viz. that whilst the warren was in the park, the deer were observed to have no horns ; but as soon as the warren was removed, they were found to be presently horned.

Mr. ASTON gave a farther account of what progress he had made in the perusal and printing of the treatise sent over by Dr. WILHEM TEN RHYNE : and he read a letter, which he had written concerning the same to his friend in Holland.

Mr.

Mr. CLUVERUS was desired at his leisure to peruse the discourse published and presented by Dr. WALLIS, viz. PROLEMY's Harmonics; which he undertook to do.

*April 26.* The whole time of the meeting was employed in entertaining the Morocco ambassador, by shewing him the repository and library; with which his excellency seemed well pleased, but more particularly with a very fair Alcoran written in Arabic.

After his excellency's return into the meeting-room he inscribed his name in the charter-book among the Fellows of the Society in a fair character in Arabic, and so was waited upon to the gate, where he took coach and returned.

*April 27,* at a meeting of the COUNCIL were present,

SIR CHRISTOPHER WREN president	
SIR JOHN LOWTHER	Dr. GREW
Mr. HILL	Mr. ASTON
Dr. CROUNE	Mr. HOOKE.

A letter of Mr. WILLIAM BALLE to Mr. HOOKE concerning his arrears due the Society being read, wherein he desired to know what they were,

It was ordered, that Sir JOHN HOSKYNs be desired to acquaint Mr. BALLE what arrears were due from him to the Society, and to procure from him a positive answer concerning them. Mr. BALLE's bond was dated 21 Oct. 1676.

It was desired, that Mr. ASTON and Mr. HOOKE should meet on the Monday following to draw up a catalogue of benefactors.

Mr. HILL acquainted the council, that Dr. CASTELL had paid his arrears, and desired to take up his bond: Whereupon his bond was presently delivered to Mr. HILL to be returned to the doctor.

The bill for 1300 *l.* was delivered to Mr. HILL, and he was desired to have an indorsement upon it, so that the money may be called in when the Society shall have occasion for it.

Upon the report of Dr. MILLES's answer touching his arrears, it was ordered, that Mr. HOUGHTON should be desired to carry him a note of what was due, and acquaint him, that he had given his hand for the payment thereof; and that the council had ordered the bonds of all such, as had not duly paid their dues, to be forwrit put in suit.

Dr. CROUNE was desired, and undertook, to speak to Dr. COXE in particular con-

cerning his arrears due to the Society. After which Mr. HOUGHTON was desired to call upon him for the same.

Mr. HOOKE was desired, when he should meet Mr. COLGRAVE, to inquire of him how the arrears of the late Marquis of Dorchester might be procured from the Lady GRACE PIERREPOINT.

May 3. Sir JOSEPH WILLIAMSON was desired to take the chair.

The minutes of April the 19th were read.

Mr. COLLINS presented his book about *Salt and Fishery* \*.

Dr. PLOT presented his *Natural history of Oxfordshire, being an essay towards the natural history of England* \*.

Mr. HOOKE read a discourse about the manner and reason of the propagation of light, whereby he explained the difficulties of DES CARTES's propension to motion, and Mr. HOBBS's conatus to motion, by showing how they might both be understood to be actual local motion: which was done by shewing what was to be understood by a human moment and a sensible space, and how much shorter moments, how much smaller bodies, how much shorter spaces, how much quicker motions might suffice to perform the several propagations of the local motions of light through a sensible particle of body thousands of various ways successively, without interfering with one another †.

This occasioned much discourse, and some difficulties supposed therein were removed by some farther discourses thereupon.

Mr. HOOKE shewed some experiments of colours, as particularly the changes made into green by spirit of urine, and into purple by aqua fortis put upon a blue syrup of violets.

He shewed also the experiment with the tincture of *lignum nephriticum*, which by a solution of salt of tartar after some time standing grew thick and muddy, but by pouring in a little spirit of nitre, began to grow clear up from the bottom, and so made a representation of the changes caused in the air by the various steams arising out of the earth.

Hereupon Sir JOSEPH WILLIAMSON inquired, whether the barometer had been any further improved; and whether yet any certain theory had been founded.

Mr. HOOKE answered, that the barometer, that stood in the meeting-room, shewed the alterations very sensibly; so that the alterations, which in the common barometer were but two inches, were by that made four feet; and conse-

\* Printed at London 1682 in quarto.

† Printed at Oxford 1677 in folio.

† See Mr. HOOKE's *Posthumous Works*, p.

129 & seq.

quently the thousand part of the whole difference was made very sensible: that there had not been any more rules made different from those, which he had taken notice of twenty years before, viz. that in windy and rainy weather the quicksilver was lowest; and that in calm and dry weather it was highest: But the cause was not yet determined: that he had farther observed the smooth under surface of the clouds to be high in dry weather, and low in wet: that he conceived, that the lower region of the air might be increased or diminished by the steams issuing out of the earth at one time, and being soaked up or imbibed at another: that in thundry weather he supposed great quantities of hot sulphurous steams to issue out of the earth, which caused the fultriness that preceded: that he had often seen the lightning kindle at the surface of the earth, and dart up into the clouds; and had often seen the thunder-cloud increased by continued steams of vapours, like smoke rising under the cloud, and ascending into it: and that the clouds seemed to swim like froth upon the surface of several regions of air.

A gentleman recommended by Mr. BOYLE shewed the Society some tables of multiplication, by which he affirmed, that multiplication, division, and the extraction of the root might be much facilitated.

Mr. HOOKE, Mr. COLLINS, and Mr. CLOVERUS were desired to meet this gentleman at Dr. PELL's lodgings on the Friday following at four in the afternoon, and to draw up a report to the Society concerning these tables.

The experiments appointed for the next meeting were for the trying of the strengths of several sorts of timber.

May 10, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN president

Mr. HILL

Mr. FLAMSTEAD

Dr. WOOD

Mr. ASTON

Dr. GREW

Mr. HOOKE.

Mr. PACKER

Mr. HILL acquainted the council, that he had received 13 *l.* from Sir NICHOLAS STEWARD, and had given him an acquittance in full of all his arrears.

Upon Mr. HILL's reporting the answer of Dr. CROWE to his demand of the doctor's arrears, it was resolved, that Mr. HILL should acquaint the doctor, that what he paid should be disposed of for the use of the Society with his good liking.

Mr. HILL reported, that captain WOOD was lately dead at Portsmouth; and that he doubted, that little of the captain's arrears would be received.

Mr. PACKER having a deputation from the president to be vice-president, was sworn as vice-president.

k

Dr.

Dr. Wood having also a like deputation, was likewise sworn vice-president.

It was ordered, that the treasurer should be desired to send immediately Mr. HUNT to such members, as were more intimately concerned in the affairs of the Society, by being actually at present, or having been of the council, desiring them, that they would give a good example to others, by paying all their arrears; and the rather at present, because of the approaching term, that the Society's resolutions of proceeding to suit in case of refusal may be proceeded upon. Mr. HUGH-TON was also desired to be assistant herein, to apply to such persons, as the treasurer shall direct.

At a meeting of the SOCIETY on the same day, Mr. HENSHAW vice-president in the chair:

The minutes of the preceding meeting were read.

Whereupon was occasioned some farther discourse concerning the barometer; and Mr. HENSHAW was of opinion, that the gravitation of the air was caused by new \*\*\* from other parts to the upper regions of the air. Mr. HOOKE thought, that most of these changes might be caused, partly by the temperature of the seasons, as to heat and cold, partly by particular exhalations and breathings out of the earth itself, and the particular qualifications of the earth at that time; for that it was observable, that the earth at some times was more spongy and sucking than at others; partly also by the very nature of the air itself caused by such exhalations, being sometimes more apt to dissolve, at other times more apt to precipitate moisture.

Dr. SLARE shewed a very large calculus taken out of the kidney of a woman about four years before, who yet neither knew, that she had the stone, nor died of that distemper.

The mask-head of Signor JOHN ALPHONSO BORELLI was sent into the Society by Mr. OCTAVIAN PULLEYN, being presented to the Society by the Lord Kingston.

Mr. HENSHAW presented a very curious small tortoise, as also a piece of a shell, whereby the helical contortions of the central parts appeared very plainly.

The experiments were the trial of the strength of several sorts of timber by the help of an engine, made after the manner of a double stiliard or lever, whereby it was found, that a parallelopiped \* inches broad, and \* inches thick, and \* inches long between the two places of bearing, being charged in the middle with the weight of seven great hundreds did but just break, and that not till after it had sustained the said weights several minutes.

May 17. Mr. Mr. HENSHAW vice-president in the chair:

The minutes of the preceding meeting were read.

Mr. FLAMSTEAD read part of a letter from Mr. CASWELL, containing several observations made by him in his travels about the surveying of the west parts of England.

Dr. SLARE gave an account from the Morocco embassador of a certain person, who was always dumb except at noon.

Hereupon Dr. GALE related his conversation with the chirurgeon at Lambeth, who had been dumb for three or four years, and was recovered first in his presence, by praying by him : and that much of the printed relation concerning him was true.

Mr. LODWICK, who was very well acquainted with this chirurgeon, both before and since, gave an account of what he knew concerning him.

Mr. HOOKE read a discourse of his own about local motions, sensible and insensible times, and celerity, being a farther continuation of the discourse read by him to the Society in the meeting of the 3d of May, which was well approved.

The experiments were made in order to find the exact strength of several sorts of wood, white fir, ash, &c. by trying what weight on the middle of a prism of the wood of a certain length, breadth and thickness, was sufficient to break it.

May 24, Sir JOHN HOSKYNs vice-president in the chair :

The minutes of the last meeting were read.

Dr. SLARE brought in a letter in Latin to himself from Dr. ELSHOLZ, dated at Berlin 30 April 1682, which was read, and contained an answer to certain queries sent by Dr. SLARE concerning the propositions, which were lately published in the *Philosophical Collections*\*, and ascribed to the said Dr. ELSHOLZ. But from this letter it appeared, that they were the propositions of GEORGE MOLLERUS, who asserted, that he was able to make them good ; and, if he had not been fifty years old, would have come to England ; and that for a valuable consideration, he was ready to communicate all or any of them. In this letter Dr. ELSHOLZ mentioned his observations lately made about *Phosphorus fulgarius* ; and queried, whether the serum of the blood, cow's milk, or man's spittle, might not by inspissation be brought to produce a phosphorus as well as urine. This letter also inclosed the answers to Dr. SLARE's queries, which were read.

Mr HOOKE shewed an earthen vessel, which seemed as if it had been covered with burnished copper : but he conceived, that there was nothing of metal in it, but that it was a peculiar quality of the glazing, which made it lose of that colour : that he knew the way, how to make \* \* to look like silver or white metal :

that there were several ways with little or no addition to change the colour of glasses very considerably; and thereupon he shewed a piece of glass, which gave a purple, blue, green, yellow, red, according as it was held various ways to the light.

He also shewed a piece of glass, which he had newly changed into an opal in a very little time.

Hereupon the way of making chalcedonies and opals and \*\*\* was discoursed; as also concerning the Indian gold thread, the covering of which is of plated wire, but drawn finer than the hair of a man's head, and flatted and twisted about silk, as over gold twist; so that some were of opinion, that it was only a varnish: but Mr. Hooke affirmed, that he had found it to be covered with a flatted wire, which he conceived to be gold. Sir JOHN HOSKYNs supposed, that it might be some other factitious metal, and that because he had been informed they could do such things, and had likewise known a gold-beater in Green-Arbour Court in the Old Bailey, who every day made a quantity of a certain metal for his trade, by which he could get ten pounds in a morning.

The experiments tried were about the strength of several pieces of timber, by examining what weight was necessary to break a prism of each, a foot long, one inch and an half board, and an inch thick, of which size they were all made.

May 31, Sir CHRISTOPHER WREN president in the chair.

The minutes of the preceding meeting were read and discoursed of, and by the way Dr. GREW affirmed, that by trials he had found, that spittle by mere evaporation would yield a salt.

Mr. COLWALL sent in a letter, which he had received from Mr. THOMAS CRISP, dated at Dornford 27 May, 1682<sup>a</sup>, with a small animal found in digging about a pond-bank; which animal, upon being viewed, was found to be a gryllo-talpa.

Mr. Hooke produced the letters, which Dr. CROUNE had received from Rome concerning fifty copies of Signor BORELLI's book *De Motu Animalium*, sent over with a catalogue of the books to be returned; as also some accounts concerning the *Cortex Peruvianus*, or Jesuit's bark, for curing agues<sup>b</sup>; which being part in Italian and part in Spanish were rendered into English by Mr. HENSHAW.

It was desired, that copies should be taken of these papers concerning the *Cortex*, and that Dr. GOODALL should have an account of them, they being in answer to his queries.

Some further experiments were made to try the strength of timber of several sorts.

<sup>a</sup> Letter-book, vol. viii. p. 218.

<sup>b</sup> Ibid. p. 205.

June 7, Sir CHRISTOPHER WREN president in the chair :

The minutes of the preceding meeting were read, and discoursed of.

Hereupon was occasioned a discourse about the motions of pendulum clocks, concerning which Mr. HOOKE affirmed, that he had in the year 1664 read some discourses before the Society, that the length of pendulum clocks in several countries ought to be different, and therefore that the pendulum clocks could not be fit instruments for keeping time at sea sufficient to discover the longitude, though they could be carried never so steadily ; and that he had since been assured by several persons from several places, that there was such a different motion of them, that in places more towards the line they were to be made shorter to keep the same time : and that Captain SHEERLS had newly confirmed that observation, by relating his own experience at Tangier with a pendulum clock adjusted in England, before he went ; which he had found to move there too fast ; and therefore was obliged to make his pendulum longer considerably.

The president thereupon acquainted the Society, that Capt. SHEERLS was again in a short time to go to Tangier, and therefore desired, that he might be furnished with instructions for making that and several other experiments very accurately ; for that he had engaged to receive such instructions, and to do his utmost to observe them, and to give an account thereof to the Society.

Hereupon the Society discoursed farther concerning the comparative measures of several countries, both of weight, length and capacity ; and several authors were mentioned, who had taken pains in adjusting that affair ; among whom the president supposed Mr. JOHN GREAVES to be the most accurate. Dr. WIERD was also supposed to have used much care in comparing the measures of capacity with those of weight in his *Taßometry*.

Mr. HOOKE mentioned likewise Mons. PICART as having taken much pains in comparing the measures of the length of other countries with the Paris foot in his book concerning of the measure a degree upon the earth.

Hereupon the president inquired of Mr. HOOKE the reason, why the measure of a degree upon the earth was not taken here in England, as had been formerly desired. To which he answered, that if the Society would defray the expence thereof, he was willing to take care of it, and to see, that it should be accurately done : that the French in their experiments had made use of some of those means, which long before they had undertaken it, himself had propounded and discoursed of to the Society ; and that in the use thereof they had doubtless been very accurate, as appeared from the account, which they had given thereof in Mons. PICART's book ; by which notwithstanding it was evident, that they differed very little from the length of such a degree long before examined in England by Mr. NORWOOD between London and York : that therefore, if the thing were to be done now again here, it would be necessary, that yet more accurate ways should be made use for performing

forming it; or else it would be but *alio alii*: that it would be necessary both for this and any other accurate trials, that the Society should have in their custody an accurate measure of the standard-foot of London: and that for other experiments also they have the true weights and measures of England, with which to make the comparisons of other weights and measures. Whereupon it was desired, that Mr. HOOKE would take care to procure those for the Society, that they might be always ready to have recourse to, when there should be occasion.

The president was of opinion, that the best standard for this occasion would be a certain part of the length of a degree upon the earth, if at least, upon several accurate trials of the measure of a degree in several latitudes, it should be found the same, and not different, as it would be, if the body of the earth were oval, and not perfectly globular.

Mr. HOOKE read a discourse sent to him from Dr. JOHN CARTE, a physician at Manchester, of which Dr. CARTE affirmed, said, that he had sent an account to Dr. GREW about three years before<sup>\*</sup>; but Dr. GREW declared, that he had not received it. It related to a certain distemper, to which the workmen employed in the smelting mills in Derbyshire were very subject, and which was called by the country people the *Belland*.

Dr. SLARE communicated a<sup>\*</sup> letter sent to him by Dr. ANTHONY NUCK, dated at Harderwick 18 May 1682, in which were some remarkable particulars: that Monf. ANDREAS, professor of philosophy at Faneker, had in a treatise, intitled, *Bilanx Bilfana & Clauderiana*, lately published by him, boasted himself to be the only person, who since DE BILLS knew the secret of embalming bodies in DE BILLS's method, though he did not in that book discover it, but only his own ignorance in anatomy: that in the mean time the heirs of DE BILLS affirmed themselves only to know it, and had lately offered it, but at too high a price, to a friend of Dr. NUCK: that BLASIUS was printing a treatise, which he called *Anatomia practica*; as also Dr. WILLIS's works with an index reduced into another method.

That Monf. BIDLOO, a skilful chirurgeon of Amsterdam, had newly shewed him above 100 anatomical figures of the parts of a man as big as the life, engraven on copper, with a description of the parts, but not of their use.

That a physician of Amsterdam had written a learned treatise concerning the muscles, and intended to publish it, if he had leisure.

<sup>\*</sup> In the Letter-book, Vol. viii. p. 67. is a letter of Dr. CARTE to Dr. GAEW, dated at Manchester 6 Decemb. 1678. mentioning, that he had written to him before concerning the *Belland*, and that he had since been in Derbyshire, where all that he could learn farther of it was, that the workmen were less subject to it in those smelting mills, that stand in an open

and moveable air, or that have a large chimney, and are not built close: that he had met with a gentleman, who told him, that a servant or two of his had it very severely in their bellies, and were cured by taking the salt, which comes from the sulphur-well at Knareborough: and this remedy was one of the likeliest, that he, Dr. CARTE, had heard of.

That

That Dr. MUNICKS of Utrecht was writing an *Œconomia Animalis*.

That Dr. NUCK himself had discovered the mouths of several vessels not yet described near the cheek tooth, as also the trunks and branches of the greater salival ductus's dispersed through the glands; together with the branching of the small arteries in those glands, which he had preserved by injecting wax, and thereby could shew the clinging of these curious vessels to the arteries like ivy to a tree: that in the cavity of the breast he had discovered several lymphatic vessels rising from the glands, and discharging into the veins, which he found by the discovery of multitudes of valves in the said vessels; of which he inserted a figure and description: that he had dissected the vessels of the lungs, and so preserved them by filling each of them with wax of a different colour: that he had made some curious observations on the divarication of the bronchial arteries: that he had found out an excellent way of preserving the lungs of animals by inflation, and had by him those of a horse, a dog, a cat, and an hare: and that he was very ready to send to the Royal Society any specimens of his anatomical preparations, which they should desire.

Mr. HALL presented to the Society for the repository a large glossopetra found by one HENRY GRIFFITH of Colesford in the forest of Dean, miner in the Blacks in the parish of Staunton in the county of Gloucester.

The experiments were some farther trials about the strength of several sorts of wood.

June 14, Sir JOHN HOSKYNs vice-president in the the chair.

Upon reading the minutes of the 7th concerning the quicker or slower motions of a pendulum in different climates, Sir JOHN HOSKYNs remarked, that the Society had formerly made trial of wire-pendulums of about 38 inches in the way of a common measure, and he thought, that the alteration made by the air might be avoided by inclosing them in a glass with a quicksilver register.

Upon mentioning, that Mr. HALLEY had found his pendulum at St. Helena slower upon a mountain than at the bottom, it was desired, that he would communicate that and such like philosophical observations, as were not yet entered in the Society's books.

Sir JOHN HOSKYNs suggested the putting Captain SHEERES upon inquiries concerning the plants growing about Tangier, adding, that formerly there had been something of that kind done there; but that the design came to nothing on account of the untimely death of the person, who managed it: and that Dr. LAWRENCE, now living there, was thought a fit person for such inquiries.

Upon reading the account of the *Belland*, a disease common among the workmen in the smelting mills, which had been sent to Mr. HOOKE from Manchester, Dr. GREW said, that he had one from Keckworth, which he was willing to produce and compare with it.

Dr.

Dr. GALE proposed to the Society the considering of some method to keep the manuscripts of the Arundel library from being destroyed by worms. Upon which Sir JOHN HOSKYNs observed, that Sir KENELM DIGBY used to wash the leaves of his books with alum water, which made them fit to write on, kept them from cankers, and gave them a lustre: and that honey mingled with the glue keeps it from being brittle and breaking. Dr. SLARE added, that honey is put into several medicaments to keep them from hardening. It was remarked likewise, that bad glue and wooden covers breed worms; and that pasteboard is the most convenient binding.

A book intitled, *New Experiments and Observations made upon the icy Noctiluca*, &c. \* was presented by the author, Mr. BOYLE.

An Indian bird's nest was presented from Dr. ALLEN.

WALTER MILLS, M. D. fellow of the college of physicians, London, was proposed candidate by Dr. SLARE.

June 21, Dr. GALE was desired to take the chair.

The minutes of the preceding meeting were read and discoursed of; and upon mentioning of pendulums, Mr. HILL remarked, that GASSENDUS in one of his discourses had affirmed, that he had observed pendulums to move quicker in winter than in summer.

A letter from \* \* to Dr. GREW † was read.

Mr. FLAMSTEAD observed, that it was remarked, that if the workmen employed in the smelting mills worked every other week in the mine under ground, they would escape the belland; but if they continued much longer in the smelting mills, they would certainly be some way or other affected with it.

Dr. GALE made a motion concerning the new binding of the manuscripts of the Norfolcian library, they being much decayed. This being discoursed of was referred to the council to consider of at their next meeting.

Mr. HOOKE read a long discourse, being the substance of three lectures, which he had missed the reading of at two last meetings, concerning the means, how the soul becomes sensible of time, explaining the organ of memory, and its use for retaining and producing ideas therein stored up †.

June 28, Sir JOHN HOSKYNs vice-president in the chair:

\* Printed at London in 1682, in 8vo.

† This was probably that on the belland, men-

tioned at the preceding meeting.

† See his posthumous works, p. 140, & seq.

The minutes of the preceding meeting being read and discoursed of, there being several persons present, as Sir JOHN HOSKYNs, Sir WILLIAM PETTY, Sir ROBERT SOUTHWELL, Mr. HENSHAW, Monf. JUSTEL, Monf. AUZOUT, and others, who were not at the last meeting when Mr. Hooke's discourse was read, it was desired by them, that Mr. Hooke should read the same again, which he accordingly did.

After which some objecting, that this discourse seemed to tend to prove the soul mechanical, Mr. Hooke answered, that no such thing was hinted, or in the least intended in it; it being only designed to shew, that the soul forms for its own use certain corporeal ideas, which it stored up in the repository or organ of memory, and that by its power of being immediately sensible of those ideas, whenever it exerts its power for that end, it thereby becomes sensible of those ideas formerly made, as if they were made at that instant, but with this difference, that the farther they were removed from the center or seat of its more immediate momentary residence, the more faint are the reflections or reactions from them; and that this occasions the notion of the distance of time.

Mr. Hooke shewed a very easy way of plainly demonstrating the problem of ARCHIMEDES, whereby he proved, that the tangent of his spiral at the point of one revolution from the center will cut a ray produced from the center at right angles to the ray from the touched point; so that the part between the point of intersection and the centre shall be equal to the circumference of the circle, that passes through the point of the spiral, where the said tangent touches it; which was performed with any supposed *præcognita* in geometry known.

July 5, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the preceding meeting were read and discoursed of, and the Society desired, that Mr. Hooke would, with what convenient speed he could, print his discourses and lectures read before the Society; as also a more full description of all those several instruments, which he had shewn that year to the Society, together with the demonstrations of the grounds and reasons and use of them; which, he said, he was willing to do as soon as he could find leisure to fit them for the press.

He also more particularly explained that problem, which he had shewn at the last meeting concerning the nature of the spiral of ARCHIMEDES, and the tangent of any part thereof.

A letter of Monf. JUSTEL to Mr. Hooke was read, giving an account of a new invention found at Paris, of making wood incombustible with a small charge; an experiment of which the inventor had shewn the French King at Versailles with good success; and that the same person had undertaken to make a fire-ship of the like nature; and pretended to have a method of preserving all kinds of fruits.

July 12, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs vice-president in the chair

Mr. HILL  
Mr. COLWALL  
Dr. GREW

Dr. TYSON  
Mr. ASTON  
Mr. HOOKE.

Upon reading Mr. COLLINS's propofal for printing a book of algebra in fuch manner, as by the faid propofal appeared, it was ordered by the council, that the treafurer fubfcribe for 60 copies; and that notice be given of the faid propofal and this order at the next meeting of the Society.

It was ordered, that Sir WILLIAM PETTY be defired to accompany thofe members of the council, who by a former order were defired to fpeak to Sir JOHN CUTLER for obtaining Mr. HOOKE's arrears.

At a meeting of the SOCIETY on the fame day, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the preceding meeting were read and difcoured of.

A letter of Monf. JUSTEL was read, and he being prefent with Monf. AUZOUT gave a farther account of the making wood fcarce comfortable.

Mr. ASTON read a letter to himfelf from Mr. HEVELIUS\*.

A letter of Monf. CASSINI to Mr. FLAMSTEAD was read, containing an account of his obfervations of the eclipse of the moon \* \* \* \* \* laft, together with thofe made by \* \* \* Monf. AUZOUT, DE LA FONTANEY, at Paris, Rome, and Copenhagen, which confirm the difference of the meridians between Paris and Copenhagen found by former obfervations of the fatellites of Jupiter. To thefe Mr. FLAMSTEAD had added his own corresponding obfervations, and Mr. HALLEY fhewed his, by which it appeared, that the difference of the meridians of Paris and London was  $9\frac{1}{2}$  minutes of time.

A propofal was read of Mr. JOHN COLLINS for the printing a book of Mr. THOMAS BAKER, rector of Bifhop's Nympton, intituled, *The Geometrical Key, or the Gate of Equations unlocked; or a new Difcovery of the conftruction of all Equations, however affeſted, not exceeding the fourth Degree, viz. of Linears, Quadratics, Cubics, Biquadratics, and the finding of all their roots as well falſe as true, &c.* This propofal was well approved of after a long debate concerning it; but the conclufion of what was to be done by the ſecretary for promoting of the printing this work, was deferred till the next meeting.

\* In the journal book, vol. 7. p. 92. there is no farther account of this letter; but it was probably that infered in the letter book, vol. 8. 214. dated at Danzick, *ſub ſeſſioni ſpectici die 1682*, wherein Mr. HEVELIUS complained, that

his name had been left out of the Society's yearly catalogue for 1681.

\* This book was published at London 1684, in 4to.

Mr. HOOKE read a discourse concerning the unlimited extent and divisibility of matter, shewing the bulk of a man to be in a medium between them; and how far endeavours hitherto used had informed us concerning the media between them; and how much farther mechanical contrivances could yet advance us beyond the imaginations of most men hitherto known.

Dr. MILLS was elected.

July 19. The minutes of the last meeting were read, and every member resolved to take from the treasurer one copy of Mr. BAKER's book, the proposals of which had been read at that meeting, and to recommend it.

Dr. GREW shewed a book said to be written in the Chinese character, and to contain the principles of their religion.

July 26, Dr. WOOD vice-president in the chair.

The minutes of the preceding meeting being read, and the subject of them discoursed of, Dr. GREW mentioned, that Dr. JOHNSON was the owner of the book shewn at the last meeting; and that the two first leaves of it were wanting, which was discovered by the Indian numbers, with which the leaves were marked. It was conjectured, that the characters now used in arithmetic were taken from those characters; and that these were much the same with those of the Chinese for numbers, and so seemed derived primarily from them.

Mr. HOOKE read a passage, that he had met with in DIGGES's *Stratiticos*, wherein he affirms, that his father had a method of discovering all objects pretty far distant, which lay round about in the country; and that this was by the help of a book or manuscript of ROGER BACON of Oxford, who, he conceived, was the only man besides his father, who knew it. This was the more remarkable; for that this *Stratiticos* was printed in 1579<sup>1</sup>, which was more than thirty years before METIUS or GALILEO made their discovery of those glasses: and therefore it seemed evident, that ROGER BACON was the first inventor of telescopes, and LEONARD DIGGES the next reviver of them, both Englishmen.

Dr. PLOT being present said, that he conceived, that this book of ROGER BACON, which accidentally fell into the hands of LEONARD DIGGES, might have been in the custody of Mr. THOMAS ALLEN of Gloucester-hall in Oxford.

Mr. AUREY remarked likewise, that there was a passage in the preface of LEONARD DIGGES's *Pontometria*<sup>2</sup>, which mentions the same thing to be known by him; and that he had shewn it to divers; which book was printed some time before the *Stratiticos*<sup>3</sup>.

<sup>1</sup> At London in 4to.

<sup>2</sup> This book is said by Mr. WOOD *Athen. Oxon.* vol. I. fol. 180. to have been attempted by LEONARD DIGGES in his younger years; and that

such parts of it, as were left obscure and imperfect at his death, being supplied by his son THOMAS, that work was printed at London 1691, in fol.  
<sup>3</sup> It was not printed till twelve years after.

Mr.

Mr. HILL observed, that there was a great controversy between the said DIGGES and the Lord chief baron \* \* to which of them the reviving of that invention was to be ascribed.

The same thing is also mentioned in Dr. DEE's commentary upon ROGER BACON's epistle to the pope.

Mr. HILL took notice likewise, that FRACASTORIUS had mentioned in the 8th chapter of his *Homocentrica* his being able to discover things at a distance by the help of two spectacle glasses set at a distance one before another; which was about the year 1530.

Dr. GREW presented a calculus or stone very hard, voided by stool, and sent by Mr. MATTHEWS of Ledbury near Gloucester.

He presented also from Dr. JENNER a box of *lapides Judaici*, taken up in Lydiard park near Swindon in Wiltshire.

Dr. GREW read a letter from Dr. COGA, vice-chancellor of the university of Cambridge, wherein he mentioned, that HEVELIUS's last book was not to be found in that university.

Mr. HOOKE shewed a Chinese perspective-box, in which by help of reflection the room and figures were considerably lengthened.

He also gave an account of the theories contained in the second volume of BORRELLI's book *de Motu Animalium*.

He shewed two optical experiments in a darkened room, the one of the succeeding of colours, viz. yellow, green, and blue; and the other of making the representation of a man's face and body, or any such object, of any convenient bigness, so as to be able to delineate the same exactly upon paper, cloth, or the like.

August 2, at a meeting of the COUNCIL were present

Sir CHRISTOPHER WREN president

Mr. HILL

Dr. GREW

Mr. COLWALL

Mr. ASTON

Dr. CROUNE

Mr. HOOKE.

The draught of a statute brought in by the president was read, and debated, and some amendments made therein; and was again read in the following words, viz.

"The Society being inflated in a revenue, which, it is hoped, may in time improve to be answerable to the expences, and not contemptible in order to  
2 "the

“ the ends designed ; the council think it not reasonable, that any members should  
 “ be eligible into the council, who are so far from improving the revenue, that  
 “ they are backwards to pay their own just dues : and therefore propose the  
 “ following statute ;

“ No person shall be capable of being chosen into the council, who hath not  
 “ at or before the tenth day of November preceding the election accounted with  
 “ the treasurer, and paid his dues to the Michaelmas before : and in order there-  
 “ unto the names of those, who have not paid till the Michaelmas preceding,  
 “ shall not be inserted in the printed lists for the use of the Society at the election  
 “ day.”

It was put to the vote, whether this statute shall be read at another meeting ;  
 and it was unanimously agreed to. .

The draught also of a second statute being read and debated, the question  
 was put, whether this statute should be read at another meeting of the council, and  
 was unanimously agreed to. The statute was as follows :

“ The statute for election of fellows having by long experience been found in-  
 “ sufficient for bringing in persons qualified for the ends of the institution of the  
 “ Royal Society, few balloting in the negative, and presuming the person to be  
 “ well known to the member, that proposeth the candidate ; it is thought requisite  
 “ by the council to propose this statute following ;

“ Every person, that would propose a candidate, shall first give in his name to  
 “ some of the council, that so in the next council it may be discoursed *vid*  
 “ *roce*, whether the person is known to be so qualified, as in probability to be  
 “ useful to the Society. And if the council return no other answer, but that  
 “ they desire farther time to be acquainted with the gentleman proposed, the pro-  
 “ poser is to take that for an answer : and if they are well assured, that the can-  
 “ didate may be useful to the Society, then the candidate shall be proposed at the  
 “ next meeting of the Society, and balloted according to the statute in that  
 “ behalf ; and shall immediately sign the usual bond, and pay his admission-mo-  
 “ ney upon his admission.”

Dr. CROUNE presented to the Society six books lately sent him from Italy, viz.

*ESCHINARDI Centuria Prob. Opticorum, 4to.*

*Borelli EUCLIDES restitutus, 8vo.*

*ARCHIMEDES & APOLLONIUS, 8vo.*

*Observationes cometice.*

*Ragguagli del ESCHINARDI.*

*Il Jovisro di CROLLIO.*

*Aug. 5,* at a meeting of the COUNCIL were present

Sir

Sir CHRISTOPHER WREN president

Mr. HILL

Dr. GREW

Mr. COLWALL

Mr. ASTON

Mr. HENSHAW

Mr. HOOKE.

The order of August 2d relating to a statute to be made for rendering persons not eligible, who had not paid their arrears, was again read; and it was thought not fit at present to be made a statute: but it was thought, that an order to the following purpose might produce the same effect:

That the list be printed with several titles distinguishing all the fellows into the foreigners honorary and such as usually attend the Society, and pay their dues; and that a little mark be made before their names of such, as have been benefactors, and such as frequently account with the treasurer for their arrears: and that the president intimate to the Society, that he hopes they will esteem such, who shew their affection to the Society this way, as more properly eligible in to the council than such, who are not like to attend their affairs, notwithstanding they are left to their liberty according to the statutes, &c.

The second statute, which had been read the 2d instant, was read again, and fully debated, and being put to the vote, it was passed in the affirmative *nemine contradicente*.

Aug. 9, at a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN president

Mr. HENSHAW

Mr. COLWALL

Dr. GALE

Dr. WOOD

Mr. HILL

Dr. GREW.

It was considered, whether the following persons should not be left out of the lists to be printed, which was agreed to, with reservation to make amendments at the next meetings:

The Lord ANNESLEY

Mr. JOSEPH MOXON

Dr. AGLIONBY

HENRY Earl of Peterborough

Sir THOMAS CLUTTERBUCK

RICHARD Earl of Ranelagh.

The Lord DURSLEY

Sir NICHOLAS SLANING

The Lord Viscount FITZHARDING

Mr FRANCIS BORTHWICK

Sir FRANCIS VANE

Dr. SAMUEL WOODFORD

Sir HENRY FORD

Dr. BENJAMIN WOODROFFE

Sir WILLIAM LE HUNT

ROBERT Earl of Yarmouth

Sir ANTHONY LOWTHER

ARCHIBALD Earl of Argyle

Dr. JACQUES DU MOULIN

CHARLES Earl of Carlisle

Mr JENKES

JOHN Earl of Crawford, LINDSAY.

Mr. OLIVER HILL

These

These twenty three were ordered to be left out of the lists to be printed for the election on the 30th of November next; and also to be left out of the treasurer's book for the future.

Mr. SHERIDAN desiring to pay in 10 *l.* it was left to Dr. WOOD to treat with him.

Sir JOHN BANKES's arrears to Michaelmas 1681, were 48 *l.* 14 *s.*

The treasurer was allowed to abate for absence, if desired.

*Octob.* 19, at a meeting of the COUNCIL were present

Sir CHRISTOPHER WREN president

Sir JOHN HOSKYNs

Mr. HILL

Sir CYRIL WYCHE

Dr. TYSON

Mr. COLWALL

Mr. HOOKE.

Sir JOHN HOSKYNs propounded a particular of an estate near Raleigh in Essex, which was read and debated, whether it were fit to be purchased by the Society. It was valued at 86 *l.* *per ann.* and there was demanded for it 1400 *l.* which was about seventeen years purchase. It was thereupon resolved, that Dr. WOOD should be consulted with, and desired to procure such an information concerning the same, as the council might thereupon ground their farther proceeding about it. To this end Sir JOHN HOSKYNs was desired to write that day to Dr. WOOD to that effect.

Mr. HILL also propounded a fee-farm-rent payable from Monmouth of 40 *l.* *per ann.* and somewhat more. This was thought fit to be considered of, when an account concerning the former proposal should be returned.

It was farther discoursed, whether it were not the best way for the Society to lay out their stock in purchasing actions in the African company, or in some other company, if neither of the former ways should be thought fit to be proceeded with.

*Octob.* 25, at a meeting of the COUNCIL were present

Sir CHRISTOPHER WREN president,

Sir JOHN HOSKYNs

Mr. PACKER

Mr. HILL

Mr. ASTON

Mr. COLWALL

Mr. HOOKE.

Dr. WOOD

The proposal of Sir JOHN HOSKYNs concerning the estate to be purchased by the Society at Raleigh in Essex was again debated; and Dr. WOOD gave an account of the situation of the place to be five or six miles within the hundreds; and that

that therefore it would not be valued at above years purchase: and that because of the difficulty of tenants, and because at that time he had himself newly agreed for another estate within the hundreds at thirteen years purchase; and that some estates had been sold for twelve years purchase; though some others had yielded, but very seldom, fifteen years purchase. Whereupon Dr. Wood was desired to inform himself farther concerning it, and to give the Society an answer; which he undertook to do.

Upon reading over the list drawn up and agreed to by the council, August 9, 1682, concerning such members, as were ordered to be left out of the treasurer's book, and the list of the Society, it was agreed to, and ordered, that those twenty three members, mentioned in the said list, should be left out of the list to be printed for the next election, and out of the treasurer's book for the future.

The council likewise in perusing the lists, and finding many fellows of the Society exempted from payments in whole or in part, either by order, promise, or intimation at their admittance, conceived this way to have been prejudicial to their affairs, and a discouragement to others, who duly paid; and considering, that the reason of their exemption was in consideration, that those members were admitted for their great abilities to be serviceable in their experiments or otherwise to the Society, and were therefore exempted from payment; it was ordered, that for the future no person should be exempted from payment, or left out of the treasurer's books, except foreigners. And if the members formerly exempted shall be pleased to bring in experiments at their own charge, they shall be considered by striking off their dues in balance to their service and charge, and not otherwise. And whereas the Society looked upon themselves as guests to the fellows of Gresham-college, the council did not intend to charge them with payments, but, if they desired it, to take off their dues annually in consideration of their kindness; though they hoped also, that those fellows would contribute their labours and studies.

Mr. COLWALL moved, that the bonds of such of the Society, as were much in arrear, might be put in suit; which being debated, it was agreed and ordered, that Mr. HOOKE should find out the bonds of Dr. WHISTLER, Dr. MILLES, Dr. ALLEN, and Dr. CROUNE, and speak to Mr. BAILLOT to take care to put the same in suit. But before he was to do this, it was ordered, that Mr. HUNT should attend upon each of them, and acquaint them with the order, to see whether they would pay their respective dues without farther trouble.

Mr. COLWALL acquainted the council, that he designed to propose Mr. TURNER and Mr. PAGET for candidates at the next meeting of the Society.

Mr. HOOKE also acquainted the council, that Mr. HAAK designed to propound Mr. ARNOLDUS candidate. But the consideration of this matter was respite till some farther resolution be concluded by the council.

On the same day the Society upon summons sent by the president met again,  
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after their recess, at Gresham-college, Sir CHRISTOPHER WREN the president being in the chair.

MONS. JUSTEL and MONS. AUZOUT desired, that MONS. HUBIN, enameller to the French King, might be admitted to be present, for that he had some experiments to shew the Society; which was granted.

MR. HOOKE read a discourse concerning comets<sup>a</sup>, and in this first part of it gave an account of several of his own observations concerning the appearances of the comets in 1680 and 1681; in which he mentioned several new and wonderful appearances of them, taking notice of the other remarks concerning them, as of their place, position, magnitude, motion, way or course, only in short, and by the bye, referring his observations in those particulars to the other parts of the discourse.

DR. LISTER's translation and notes of GOEDARTIUS *de Insetis*, fifty copies of them having been bought by the Society for the use of their members, were brought in, to repay the treasurer what had been laid down for them.

MONS. HUBIN shewed the Society three experiments:

The first was a syphon fountain neatly made, which is at large described in SCHOTTUS.

The second was an icuncula, which descended and ascended in the water by the pressure of the thumb upon the top of the water; which had been shewn to the Society several years before.

The third was a small glass cane of water so well exhausted of air, that with the shake of the hand the water would sink so briskly against the bottom of it, as to sound like the stroke of some very hard body: which was an experiment, that had likewise been several years before shewn the Society.

MR. HOOKE shewed a new projection of the sphere into a concave cylinder, which could be opened into a plain, in which he described the rhomb lines geometrically and mechanically by a very easy instrument, and very fit for the use of navigators.

MR. JOHN COLLINS delivered to the members of the Society proposals for printing Mr. BAKER's *Geometrical Key*.

Nov. 1, at a meeting of the COUNCIL were present

<sup>a</sup> See his *Posthumous Works*, p. 149. *Ed. fagg.*

<sup>b</sup> So he is filled in the books of the Society from this time, though he had not the degree of

doctor of physic till March 1682, when he was created so by the university of Oxford. Wood Fast. Oxon. vol. II. col. 224.

Sir

Sir JOHN HOSKYNs vice-president

Sir JOHN LOWTHER

Mr. COLWALL

Mr. HILL

Mr. PACKER

Dr. GREW

Dr. TYSON

Mr. ASTON

Mr. HOOKE.

It was again debated concerning the propounding of Mr. TURNER, and it was put to the vote, and there were eight affirmatives and one negative.

It was thereupon debated and ordered, that a paper should be drawn up concerning the conditions, upon which persons were admitted into the Society.

Dr. GREW read a letter of Dr. LISTER, wherein mention was made of the prices of the forty seven books for the Society's use; and it was thereupon ordered, that the treasurer should pay 17*l.* 12*s.* 6*d.* to Dr. LISTER for the same.

It was again debated, whether the twenty three members mentioned in the list to be left out of that to be printed against St. Andrew's Day, should also be left out of the treasurer's book for the future; and it was agreed on and ordered to be done accordingly.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the preceding meeting were read and discoursed of.

Mr. HOOKE delivered in the pictures of five strange birds, which had been taken at Nuremberg in Germany, and there delineated and ingraven in copper. They were presented by Mr. ARNOLDUS, who had lately received them from Nuremberg. 1. An onocratulus. 2. Scherben or seerab, as it is called in High Dutch, a kind of Soland goose. 3. A strange kind of breasted duck. 4. A kind of bittern. 5. A sort of bustard. They were ordered to be kept in the library with Mr. WILLUGHBY's *Ornithologia*.

A paper sent by Sir ROBERT SOUTHWELL to Mr. HENSHAW was read, containing a more full and exact description of the subterraneous cavern near King-road by Bristol, formerly described by Captain STURMY.

Dr. WALTER MILLS was admitted follow.

Mr. HAAK presented a printed sheet, intitled *Epistola invitatoria ad observationes magneticæ variationis communi studio junctisque laboribus instituendas*, à JOHANNÉ CHRISTOPHERO STURMIO, P. P. Altdorf. The contents of which were related by Mr. HAAK, who had perused it, to be an invitation to such, as were intelligent and curious to make observations of the present variations of the magnetic needle from the meridian of their respective places of abode, with a desire,

Y 2

that

that they would communicate such their observations to Mr. VOLCKAMER at Nuremberg, that they might be published for the common benefit. Professor STURMIUS delivered four rules how he desired the observations should be made. 1. That they should all agree upon one certain time, viz. on the next equinoctial and summer solstice days; and the meridian being once fixed, to respect the observation every month. 2. To take great care in finding the true meridian by large instruments, and some other ways described by him. 3. To have two very good needles well fitted to shew minutes, which must not be either very large or very small, but of a middling sort. 4. To take care to avoid the proximity of iron, or other magnetical body, at the place of observation.

November 8, Sir JOHN HOSKYNs vice-president in the chair :

The minutes of November 1 were read and discoursed of, particularly concerning Professor STURMIUS's proposals about making and collecting observations of the variation of the magnetical needle. Upon which Mr. HOOKE related, that he had lately got an observation to be made thereof at Lisbon, and expected to receive an account from Ireland, and some other parts, concerning the same.

Mr. HOOKE read a letter, which he had received from Dr. CARTE of Manchester, giving an account of some observations, which he had made on a patient, who had voided by vomit and stool several live millepedes\*, some of which were produced and shewn.

He communicated likewise a letter from a friend, giving an account of the observations made by him in the anatomy of a bat, &c.

He read also an account from a friend of his, giving an account of a lamb, that had been taken out of an ewe, which had been generated *extra uterum*; and mentioning a woman lately deceased in Cornwall of the age of 154 years.

Dr. TYSON related, that he had received an account from Oxford of a bitch, which had divers puppies generated *extra uterum* in the abdomen.

Mr. HOOKE read part of a further discourse concerning his observations and theory of comets; and the remainder of it was referred to another meeting.

Dr. CHAMBERLAYNE's proposals about a bank of credit were left with the Society, together with his answers to several objections, that had been made against it.

November 15. Dr. GALE vice-president in the chair :

The minutes of the last meeting were read and discoursed of.

\* This letter is printed in Dr. HOOKE's *Philosophical Experiments and Observations*, p. 75.

† Mr. TURNER and Mr. PAGET were elected

fellows at this meeting, though there is no entry of it in the *Journal-book*, vol. vii. p. 101. See the minutes of the following meeting.

With

With regard to the great age, to which some persons attain, Dr. GALE related, that in a trial at law at York, the testimony of a person was admitted for 120 years or more. This man lived at Ellerton, near Richmond, in Yorkshire, and maintained himself by fishing on the river Swale. Mr. HOUGHTON added, that he had been informed, that the same person, when he died, was 157 years old. There is a record of it in the year 1665 in the Remembrancer's-office.

Mr. EVELYN remarked, that Sir WALTER RALEGH had in the account of his voyage to Virginia related, that he there met with a king of that country, who was 300 years old, and who lived also a considerable time longer, as had been certified by other writers. He supposed, that it might be Captain SMITH, who had been there, and seen him about thirty years after Sir WALTER RALEGH had been there. He farther thought, that the king's name was POUHATAN, but was not certain whether it were so or not.

Dr. GALE added, that he knew a man, who lived at Coton, not far from Cambridge, who was above 120 years old : and that he had been told there, that this man had been punished, when he was 100 years old, for fornication : that he had a renovation of his hair, and a new set of teeth, after he was of that age.

Mr. HOUGHTON mentioned, that he had been credibly informed, that the people of Ireland commonly lived to the age of 150 years.

Mr. HOOKE took notice of what Sir CHRISTOPHER WREN had formerly acquainted the Society, that the people at Hudson's Bay commonly live to 120 or 130 years of age ; and till that age are very lusty, and commonly go to hunting, which when they are no longer able to do, they usually invite all their kindred, and lie down and resign themselves to be strangled by the eldest of those, who survive, and who takes the care of government in his father's stead.

Mr. HOOKE read a further discourse concerning comets, therein explaining how it may be supposed, that comets are burning bodies, and that the blaze of them is made partly by steams into flame : that all these steams do proceed from a small solid body or star actually on fire, which is invloped with a white cloudy body of steams, or smoke, which make up the appearance of the nucleus in the middle ; from which doctrine he deduced several conclusions, which he undertook to explain more fully hereafter.

Mr. TURNER and Mr. PAGET, who were chosen at the last meeting, were admitted fellows.

*November 22, at a meeting of the COUNCIL were present,*

	Sir CHRISTOPHER WREN president
Sir JOHN HOSKYNs	Dr. TYSON
Mr. HENSHAW	Mr. ASTON
Mr. COLWALL	Mr. HOOKE,
Mr. HILL	

A committee was appointed for auditing the treasurer's accounts, consisting of the president, Mr. COLWALL, Dr. TYSON, and the two secretaries.

Upon the consideration of laying out part of the stock of the Royal Society to the best advantage, it was concluded, that 200 *l.* original stock in the African company should be bought at the rate, which it then went at, 260 *per cent.* that is in all 520 *l.* And Mr. HILL was desired to contract for the same, and to see it transferred, according to the custom in that company, giving a declaration to the Society, that the said money is in trust for the Society.

Mr. HILL presented a proposal from Mr. JOHN COLLINS concerning his undertaking to print a discourse of Dr. WALLIS's, intitled, *A treatise of Algebra historical and practical*, written in the year 1676 by Dr. WALLIS, and then sent by him to Mr. COLLINS to be communicated with other members of the Royal Society, and since enlarged by him, so as to contain not only an history, but likewise an institution of algebra, according to the several methods hitherto in practice, with many additions of his own; provided the treasurer, in the name of the Society, would engage to take off sixty copies at three half pence a sheet. This proposal of Mr. COLLINS being read, was well approved of, and Mr. HILL the treasurer was desired to do as was requested, and to take care, that as many of the Society, as were desirous to have the treatise, might be desired to subscribe for it, and take it off of the Society at the same rate.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN president in the chair.

The minutes of November 15 were read, and some amendments made therein.

Mr. ASTON read a letter to himself from Mr. HEVELIUS, dated at Dantzick 17 November 1682, N. S.<sup>a</sup>. desiring the assistance of the Society for the printing of his globes, of which he had the design ready drawn, but wanted the engraving of the plates. His proposals to be offered to a bookseller were; 1. That the author would take care of the delineations of the stars and constellations; but that the undertaker should maintain an engraver at Dantzick till the whole be completed. 2. That he would reserve the dedication to himself, and expected some globes to present to his friends, and some acknowledgment for his great labour and charge. 3. That he had the privilege of the emperor and king of Poland for the sole vending them. He added, that the undertaker and engraver should have the publication of his *Uranographia*; which would be quite finished in the spring.

In the same letter was an account of the observations, which he had made of the late comet, with some other celestial observations, and the daily places and motions of the comet taken off from a globe, but not by calculation, and a small draught of the apparent figure of the comet on the 6 of August.

<sup>a</sup> Letter-book, vol. viii. p. 231.

<sup>b</sup> This part of the letter is printed in the Phi-

losophical Transactions. Vol. xii. N<sup>o</sup> 143. p. 16. for January 1682.

Whereupon Mr. Hooke fetched his observations on the same comet, and shewed the figure of it taken by himself on the same day, having carefully observed it with a fourteen feet telescope, and delineated it with his own hand.

Mr. Hooke read the contents of a treatise of Dr. WALLIS of Oxford sent to Mr. COLLINS, to be communicated to the Society. Concerning which the author said, that the whole was submitted to the Society, to be printed, or otherwise disposed of, as they should please. If printed, he supposed it might make about fifty or sixty sheets. This was a treatise of algebra historical and practical, written in the year 1676, and then sent by Dr. WALLIS to Mr. COLLINS, to be communicated to others, who were members of the Society; and it was since enlarged so as to contain, not only an history, but an institution of algebra, according to several methods hitherto in practice, with many additions of his own; together with an account of the original, progress, and advancement of what is now called algebra from time to time, and by what steps it attained to the height, at which it then was.

A committee was chosen by ballot, to audit the treasurer's accounts, viz. Mr. COLLINS, Mr. HAAK, Dr. KING, Mr. LODWICK, and Mr. PERRY.

*November 28*, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs vice-president

Mr. HILL

Dr. TYSON

Mr. COLWALL

Mr. ASTON

Mr. FVELYN

Mr. HOOKE.

Dr. GREW

Mr. HILL sealed and delivered a declaration of trust for the 200 *l.* stock lately purchased in his name, and transferred to him by Mr. RYDER.

*November 29*, at a meeting of the SOCIETY, Sir CHRISTOPHER WREN president in the chair:

Prince BORGHESI making a visit to the Society, was entertained with seeing the curiosities of the repository and library, and afterwards in the meeting-room with some experiments mathematical and mechanical, particularly with the instruments and ways of describing various sorts of regular and geometrical curve-lines, and the use of them.

His Highness subscribed his name in the charter-books, as one of the members of the Society.

DON JOSEFFE DE FARIA, knight of the order of CHRIST, and envoy extraordinary from the King of Portugal in England, was proposed candidate by the president.

Sir JOHN CHARDIN, Knt. was likewise proposed candidate by the president.

*November*

*November 30.* The Society met upon summons, as usual, for electing the council and officers for the year ensuing.

Before the Society proceeded to the election DON JOSEFFE FARIA and Sir JOHN CHARDIN were elected fellows, and after sealing their bonds, and subscribing their names, admitted fellows by the president.

As soon as a sufficient number of members were come, they proceeded to the election of the scrutators, who were Mr. FLAMSTEAD and Mr. CLUVERUS.

The eleven continued of the COUNCIL were

Mr. ASTON	Sir JOHN HOSKYNS
Mr. COLWALL	Sir JOHN LOWTHER
Mr. EVELYN	Mr. PACKER
Dr. GREW	Sir JOSEPH WILLIAMSON
Mr. HENSHAW	Sir CHRISTOPHER WREN.
Mr. HILL	

The ten chosen into the COUNCIL were

Sir ANTHONY DEANE	Mr. PERRY
Mr. CREED	Sir WILLIAM PETTY
Dr. HOLDER	Dr. PLOT
Dr. KING	Dr. SLARE
Mr. MEREDITH	Sir CYRIL WYCHE.

The officers elected were

Sir JOHN HOSKYNS	president
Mr. HILL	treasurer
Mr. ASTON	} secretaries.
Dr. PLOT	

*December 6,* at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNS president

Mr. HILL	Dr. GREW
Mr. COLWALL	Dr. PLOT
Dr. HOLDER	Mr. ASTON.
Dr. KING	

Mr. HOOKE delivered up the bonds to Mr. HILL, the key of the chest and the council books to Mr. ASTON; and the key of the press to Dr. PLOT.

The great seal was put into the iron chest, the keys remaining in the hands of the president, Mr. HILL and Mr. ASTON.

Mr. HILL's acknowledgment of a trust of 200 *l.* stock in the African company for the use of the Society was put in the chest, as also the seal of the East-India company for 300 *l.* of the Society's lying there at interest. Mr.

Mr. ASTON was desired to speak to Mr. RICAUT about the getting some original books from Sir JOHN CHARDIN, which he seemed willing to give the Society.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs president in the chair.

Mr. ASTON read a letter from Dr. LISTER\*, mentioning his having lately met with PAYERUS *de glandulis intestinarum*; the principal part of which book he found to consist of such discoveries, as were communicated by himself to the Society, and afterwards printed in the *Philosophical Transactions* five years before that book was published.

The same letter contained an account of a tincture of indigo injected into the guts of a live dog, which after three hours was found to pass coloured into the *lacte*.

Dr. AGLIONBY, Dr. TYSON, and Dr. SLARE were desired to try over again the experiment, and to make report of the success.

Dr. SMITH was said to have observed the chyle retaining a perfume (given it) in the *lacte*.

A paper of Dr. LISTER about chyle was read, being some probable thoughts concerning its whiteness, and what it is after it is conveyed into the artery†.

Upon this Dr. GREW objected, that the whiteness of chyle proceeds not solely from a saline principle, but an oleous one likewise: that therefore the milk of all plants is oily: that the milk of goats beard dries into a gum, and burns like turpentine: and that it is the whey and buttery parts mixt together, which make milk.

Upon a discourse concerning animals ruminating some things, that are in the stomach, and not others, Dr. GREW remarked, that those animals have a sort of *papillæ* in the stomach very like those belonging to the taste in the mouth, which might be proper for distinguishing the several substances fit to be refused.

Upon reading a letter from Dr. TEN RHYNE, the camphire-tree at Chelsea was said to come from him; and a number of other plants were named as natural to hot countries, but capable of being made to grow in cold, of which it was wished that a catalogue were procured, though it was said, that VAN MUNTINO in Friesland had made most sort of trees grow in that country, even cinnamon and nutmeg.

The Prince BORGHESE having promised the Society a *pulmbus marinus*,

\* Letter-book, Vol. viii. p. 220.

† Ibid. p. 223. *U. scq.* printed in the Philo-

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sophical Transactions. Vol. xii. N<sup>o</sup> 143. p. 6. for January 1681.

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which

which is often brought forth, having foetus's in the uterus, Dr. Plot took notice out of his *Natural history of Oxfordshire* of several other animals, to whom the same thing had happened. Dr. Tyson in a dog-fish dissected at Gresham-college found a series of foetus's, some near a foot long, some three inches, and others one inch, and perfect eggs like that of a hen.

Mr. CLUVERUS presented eight months of the *acta eruditum*, published at Leipzig.

December 13, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs president,

Sir ANTHONY DEANE

Mr. MEREDITH

Sir CYRIL WYCHE

Dr. SLARE

Mr. HILL

Dr. PLOT

Mr. COLWALL

Mr. ASTON.

Dr. GREW

Sir ANTHONY DEANE was sworn of the council.

Mr. MEREDITH was desired to speak to Dr. AGLIONBY concerning his arrears in order to the compounding for them, provided that he enter into a bond for the future.

Upon a proposal of the president, that there might be an effectual course taken with such fellows of the Society, as were in arrears for their weekly contributions, it was proposed, that such persons, as were two years in arrear to the Society, should have their names left out of the list, and their bonds be sued of course,

Mr. ASTON having acquainted the council, that the *Philosophical Transactions* might be carried on the next year, if some encouragement were given to the publishers, by taking off a good number of copies, as soon as they should be printed ;

" The *Philosophical Transactions* began to be republished in January 1681, with N<sup>o</sup> 143. The Preface to that number was as follows : " Although the writing of these *Transactions* is not to be looked upon as the business of the Royal Society ; yet in regard they are a specimen of many things, which lie before them, contain a great variety of useful matter, are a convenient register for the bringing in and preserving many experiments, which, not enough for a book, would else be lost, and have proved a very good ferment for the setting men of uncommon thoughts in all parts at work ; and because moreover the want of them for these four last years, wherein they have discontinued, is much complained of ; that the Society may not seem now

" to condemn a work they have formerly encouraged, or to neglect the just expectations of learned and ingenious men, they have therefore thought fit to take care for the revival thereof, that they may be published once every month, or at such times, whereof fore-notice shall be given at the end of these and the following *Transactions*. Neither is it doubted but that those, who desire to be accommodated herewith, will most readily endeavour themselves, or by others, to supply and keep up that stock of experiments and other philosophical matters, which will be necessary hereunto ; with this assurance given them, that whatever they shall be pleased to communicate, shall be disposed of with all fidelity."

It

It was ordered, that the treasurer should buy of them at the current price sixty copies, for the use of the Society, every time that the *Transactions* should be published during the ensuing year.

It was ordered, that Dr. GREW take upon him the care of the repository under the name of *praefectus Musæ regalis Societatis, &c.* and that he make a short catalogue of the rarities, with a method for the ready finding them out : as also a catalogue of the benefactors, and the particulars given by them : that he enter into a book all such things, as shall be given hereafter, with the name of the donor, and from time to time observe what may be necessary for the preservation and augmentation of the said repository, and make a report thereof to the council ; and that he bring in to the usual meetings of the Society such descriptions of natural things there contained, as have not yet been published in his book. Dr. GREW accepted of this office.

At a meeting of the COUNCIL at six o'clock in the afternoon of the same day were present,

The President

Sir CYRIL WYCHE

Dr. GREW

Sir JOSEPH WILLIAMSON

Mr. MEREDITH

Mr. HILL

Mr. PERRY

Mr. COLWALL

Mr. ASTON.

Sir JOHN HOSKYNs took the oath of allegiance and supremacy as president of the Royal Society.

The president appointed Sir CHRISTOPHER WREN, Mr. HENSHAW, Sir CYRIL WYCHE, and Mr. DANIEL COLWALL to execute each of them the office of vice-president.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs presided in the chair :

Mr. WATTS, keeper of the physic-garden at Chelsea being permitted to be present, produced a parcel of curious exotic plants, which had been brought from the East-Indies, the names of which were *Acacia Jacatensis*; *Phacelus arboreus Malabaricus*; *Herba sentiens*; *Vicia perennis fruticosa*; *adiantum Indicum*; *Kalapar arbor baccifera*; *Acacia tinctoria maxima*; *Pæonia Zeylonica superba*; *Flas Cankin arbor baccifera*; *Muscenda Zeylon*; *Christa pavonis*; *Filix scandens à Pegu*; *Muscoides arboreus Indica à Tunquin*; *Welwendia*; *Scabiosa Zeylonica*; *Alibea Indica tinctoria*; *Fos Margri*; *Morunga*; *Priapus vegetabilis Zeylon*; *arbor trifolia flore muscato odorata*; *Polypodium Indicum Clusi*; 22. *Cinnamomum*.

A rattle-snake of about four foot long, brought alive from the West-Indies, was sent by Mr. LEEDS the merchant to be shewn to the Society. It had been four months in a barrel without eating.

Mr. HOUGHTON presented some fresh saffras berries.

Dr. GALE presented from Sir GEORGE WHEELER his book of travels into Greece and Asia.

Monf. CONRAD VAN BEUNINGEN, envoy extraordinary from the States General, was elected a member, and afterwards admitted, having signed the usual bond for the payment of the weekly contributions.

Dec. 20, Sir CYRIL WYCHE vice-president in the chair:

Mr. HOOKE brought in a tall exhausted glass with a feather inclosed, which appeared to fall from the top of a glass with a velocity equal to that of a more solid body in the air; but the same feather upon readmission of the air fell wavering and slower by many degrees. The intention of this experiment was to shew the easy divisibility of the body of the æther; that though the motion of a comet be swift, yet the resistance made to its motion is but small: and that though the flame of a comet gives a little way to the æther, yet it does not follow it, like that of a candle moved in the air, being a grosser body.

Part of a letter of Dr. LISTER to Mr. ASTON<sup>\*</sup> was read, containing an answer to some objections, which had been offered against his conjectures about the whiteness of chyle. Mr. ASTON was desired to communicate it to Dr. GREW.

A letter from Dr. TYSON to Dr. PIT was read; containing an account of the dissection of a monstrous lamb large and well grown; but when it was yeaned, not having a mouth or other passage to the oesophagus.

From hence it was questioned how this lamb was nourished in the uterus, it being the received opinion, that the fœtus takes in its nourishment by the mouth, which Dr. TYSON confirmed by several arguments, instancing particularly in an embryo, in which he found the tongue large and well formed, as being necessary for its nourishment, the legs and arms small and imperfect. Mr. HOOKE was of opinion, that the blood contributes much to the nutrition of an embryo; and in this case of the lamb there was no doubt made by any one.

Dr. TYSON judged the lamb to be suffocated, as soon as it was yeaned, by its being divided from the umbilical vessels, which communicated the air contained in the arteries of the sheep. He said, that there were two pabulums necessary for maintenance of animal life, the one sulphureous, the other nitrous. This he explained by the white and yolk of an egg; the yolk being the sulphureous pabulum analogous to chyle; the white being the nitrous pabulum analogous to the air in breathing animals: which he concluded from its fermentativeness to be impregnated with air: as also that a chick, as soon as the white is consumed in

<sup>\*</sup> This letter was dated at York 17 December, viii. p. 243. 1682, and is inserted in the Letter-book, vol.

the shall, is immediately hatched and thrust into the air, to be helpt by it; the remainder of the yolk continuing in its belly, as one part of its nourishment.

Several things were mentioned of Mr. HOOKE's experiment of blowing into the lungs of a dog, which keeps the animal alive, not by raising the lungs to make the blood circulate, but perfecting the blood by the nitrous particles of air, which have that efficacy, as to make the blood come out of the lungs an arterial blood, which entered into them a venal.

Dr. TYSON added, that he had found spirit of man's blood and spirit of nitre mixt together turn of a deep red colour like arterial blood.

Sir CYRIL WYCHE desired Dr. TYSON to produce the experiment at the next meeting.

Dr. AGLIONBY reported, that the King had lately eaten some truffles found in England as good as any beyond sea.

Sir JOSEPH WILLIAMSON remarked, that they came from Rushton, a house of Lord CULLEN's in Northamptonshire within two miles of Kettering; and he moved, that Mr. LUTTER the gardener should be inquired of concerning the particularities in the finding them, and whatever might be observable; which was approved of; and Dr. PLOT was desired to charge himself therewith.

Mr. PAYNE presented a sea-plant, rooted in, and seeming to have grown out of a hard pebble-stone, found in an oilier-barrel.

Mr. HUNT brought in a petrified moss, and a large hare's foot, given for the repository.

ROBERT PIT, M. D. professor of anatomy at Oxford, having been formerly proposed candidate by Dr. PLOT, and being desirous to be of the Society, was unanimously elected.

Mr. SALISBURY produced a brass-ring, said to be taken from the root of a sheep's tongue, and almost covered with the skin: but the person, who wrote the account of it to him, being unknown, and the circumstances of the fact not appearing, it was no farther considered.

1687. Jan. 3, at a meeting of the COUNCIL were present,

	Mr. COLWALL vice-president
Sir WILLIAM PETTY	Mr. MEREDITH
Sir JOHN LOWTHER	Dr. GREW
Mr. HILL	Dr. PLOT
Mr. EVELYN	Mr. ASTON.

Mr.

Mr. COLWALL took the oath of allegiance and supremacy, and the oath of office as vice-president.

Some of the council having lately spoken to Mr. EVELYN about buying 250 *l.* stock of his in the East-India company with a sum of money of the Society, lying then at use in the said East-India company, the council having considered of the affair, asked Mr. EVELYN, if he were willing to take 750 *l.* for 250 *l.* stock, taking his money from the sum due to the Society by the East-India company? to which he agreed. Whereupon it was ordered, that the seal of the East-India company to the Society for 800 *l.* be delivered up to Mr. EVELYN in exchange of 250 *l.* stock in the said company belonging to him; and a bond to be given the Society for the payment of 50 *l.* by Mr. EVELYN on the 25th of March next ensuing.

It was ordered and agreed, that the interest of the aforesaid 750 *l.* be to the Society until this day, and for the future belong to Mr. EVELYN: and

That the entry of the stock be made in the name of Mr. HILL or Sir JOHN LAWRENCE, and a declaration of the trust delivered to the council by the respective person.

The Earl of ANGLESEY having formerly bought Mr. OLDENBURG's books and papers, and it being supposed, that his Lordship had received several of the Society's papers therewith, it was ordered, that his Lordship should be spoken to, either to restore them, or let copies be taken.

The secretaries having drawn up a state of the papers in their office, and it appearing, that several things of the Society's had not been put into their hands, as ought to have been; it was ordered,

That Mr. HOOKE deliver up into the hands of either of the secretaries all such books and papers, as any way belong to the Society, or came to his hands upon the account of his having been secretary.

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE vice-president in the chair.

Upon the reading of the minutes of the last meeting, wherein are mentioned some reasons of Mr. LISTER's not thinking an oily substance to be necessary in the composition of chyle and other white juices, particularly of plants; Sir WILLIAM PETTY mentioned an experiment, which he had made by beating common oil with water for the producing not only the colour of milk, but likewise the taste.

But the considerations of Mr. LISTER and Dr. GREW having been upon the particular production of whiteness in bodies by oils or salts, Mr. HOOKE observed in general, that whiteness proceeded from the reflection of multiplicity of rays: that

that therefore glafs, though of itfelf transparent, yet when beaten to a fmall powder, is white; that blue glafs is the fame, and that ultramarine, the ftrongeft blue, when very finely ground, makes a whitifh powder: that in liquors two heterogeneous bodies (not mixing well together) one of which is transparent, the other beat into fmall balls, make a white by the reflection and refraction of more rays from the little opaque bodies.

Sir WILLIAM PETTY added, that vinegar by corroding lead, and dividing it into fmall particles, makes a white powder or *jaccharum Saturni*.

From the notion of white a tranfition was made to that of black, as being a body, that reflects few or no rays.

Sir WILLIAM PETTY faid, that a plate of lead turns blackifh, only by being peckt full of holes.

Mr. HOOKE remarked, that black and white marble being expofed equally to the fire, the black is much hotter than the white; becaufe this reflected back the rays, which the other did not: and that a white marble or ftone, if one half of it were coloured black, would, when expofed to the fire, be much hotter in the black part, than in the white.

The not reflecting rays from dark bodies might proceed from feveral caufes. Sir WILLIAM PETTY named three, 1. Throwing in of rays into the hollownefs of a body, which are not fent out again. 2. The flicking of rays in a body. 3. A faintnefs in fending back a ray like that of a flack ftring.

Mr. FLAMSTEAD queried, why a fponge is not blacker, fince it is fo full of holes, that abforb the light.

Mr. HOOKE answered, that though the hollownefses were many, yet there were alfo many reflecting and refracting parts in a fponge, which he had often obferved to confift of many clear pipes a little inclining to yellow. Other reflecting parts in it were many, as he had often obferved in its texture.

Dr. AGLIONBY brought in fome queries about the truffes found in Northamptonfhire, which were read and ordered to be tranfmitted to Mr. WATTS.

AN EUCLID in Greek was prefented by Dr. WOOD.

Dr. PLOT fhewed a paper with Arabic letters and fome ftrange characters, being a fpell found wrapt up in the hair of the Guinea Negros; which, they fay, makes them valiant.

An experiment was made for proving, that bodies retain their gravity in the æther; but by reafon of fome accidents in the making of it, there was nothing concluded from it.

Jan.

Jan. 10, Sir CYRIL WYCHE vice-president in the chair:

Upon a casual discourse concerning the entries of experiments brought in by the curator, some orders of the council made in the presidentship of Sir JOSEPH WILLIAMSON were revived:

1. That the experiments to be made by the curator at the next meeting be declared at the preceding meeting, to the end, that all persons might come provided to speak with relation to them.
2. That the curator give an account in writing of the intent of the experiment, as it is entered by the secretary, to the end that both the curator may be secured of a full entry, and the secretary warranted.

Mr. RICHARD WALLER brought in for the repository, a skeleton, which he had made, of a rattle snake lately dissected.

Dr. TYSON produced several figures of the parts of the rattle-snakes, as they were drawn by Mr. FAITHORNE, Mr. WALLER, and Mr. HUNT, and were ready to be engraved.

A paper was read, containing several curious observations made by Dr. TYSON upon a *tenia*, or jointed worm, which he found alive in the guts of a dog dissected by him; the worm itself about three feet long being shewn preserved in spirit of wine.

The experiments for the next meeting were to prove the gravitating of bodies in the æther; and to shew bodies different in colour to be variously susceptible of heat.

January 17. Mr. EVELYN in the chair.

The first experiment, being the proof of the gravitating of bodies in the æther, as much as the air, was made; for which purpose Mr. HOOKE brought in a long narrow glass well exhausted, having a long spiral wire fastened to the top, which bore an empty glass ball hanging at the end of it. The glass had a ring drawn round just at the fastening of the glass-ball to the wire, that the true place and feat of the ball might be observed: which being well taken notice of, the air was then let into the receiver, and the situation of the ball observed to be still the same it was before.

The second experiment was to shew the different susceptibility of heat by a white and black body: for which purpose Mr. HOOKE brought in a white marble stone, the one half of it being coloured with a black colour. When the stone had been a good while exposed equally to the fire, though the black part seemed to most present to be the hottest; yet it was agreed, that if the stone were very much heated through, the white would appear the hottest, as touching the hand with a more close and even surface.

Dr.

Dr. Tyson read a part of his anatomy of a rattle-snake\*.

In the explaining the figure of the stomach and guts, he had occasion to name that of the *Acus marinus Oppiani*; of which he produced the draught, it being one continued pipe or cavity without ventricle or valve, and something tapering towards the ends. Upon mentioning the scent-bags, which he found in the snake, full of strong scent peculiar to that animal, he discoursed of the different shapes of them in several species of animals, and their different insertions into several parts near the anus.

He supposed the lungs to contain a good part of a year's provision of air, as the stomach does of victuals; and remarked, that animals, which do not often use respiration, have commonly a bladder for the containing a large quantity of air: that animals of little heat have proportionably less expence of it; but that something of air, or what is analogous to it, is necessary even to fishes, who take it in by the bronchiae, together with the water, and not only die after being sometime out of the water, but likewise if the water in the small vessels, in which they swim, be not often changed.

Mr. WALLER brought in the figures of the jointed worm, which he had carefully drawn, both by the naked eye and the microscope; particularly the end taken for the head was found a part seeming tendinous with hooks coming out of it on all sides, whereby it fastened itself to the guts.

In a letter from Mr. LISTER, it was remarked, that the juice of a prickle-pear, either raw or preserved, might be very useful in making chyle pass tintured into the lactææ.

The experiments appointed for the next meeting were for the farther proving the gravity of bodies in the æther.

January 24. Sir JOHN HOSKYNs president in the chair.

Upon reading the minutes of the last meeting, wherein mention was made of the difference of black and white marble in receiving and reflecting heat, it was farther said, that the black is of a different nature from the other, and might probably contain something of bitumen.

A letter from Dr. PLOT to Mr. ASTON\* was read, containing some observations concerning the brines in Staffordshire, and the generation of sand in them upon boiling, though they are strained through ever so many folds of fine lawn.

The dissolubility of these sands in water having been mentioned as attempted, it was conceived not practicable; and Mr. HOOKE said, that nitre might be

\* It is printed in the Philosophical Transactions, vol. xii. N° 144. p. 25. for February 1687.

Letter-book, Vol. viii. p. 250. It is printed

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ed in the Philosophical Transactions, Vol. xii. N° 145. p. 96.

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mixed with sand, and baked in an oven so as to lose its saltness, and become a perfect stone no ways dissolvable in water.

Upon mentioning small animalcules found in Staffordshire brine, and passing through the finest strainer, it was said, that there had been animalcules found in sea-brines made by the sea at Limington.

From hence a discourse happening concerning animals in pepper-water, Mr. Hooke gave notice, that he had observed them turned into auriclias, which he would shew the Society at their next meeting.

Dr. TYSON read a continuation of his *Anatomy of a rattie-snake*.

Mr. COLWALL presented to the Society for the repository fourteen particulars given him by Mr. JOHN EVANS, who brought them from the East-Indies, which were, 1. A small cup made of a rhinoceros's horn. 2. A piece of rhinoceros's skin. 3. A petrified crab. 4. A sea-bean. 5. A mirabolin. 6. A snake-stone. 7. A piece of kannanore-stone. 8. A piece of fallow wood. 9. A piece of Entacka wood. 10. A cullumba root. 11. An Arabian stone to provoke urine. 12. A piece of wood good for green wounds. 13. A piece of China ink. 14. A piece of benzoin.

He also gave some shells found near Reading 20 feet under ground.

Sir CHRISTOPHER WREN produced a letter to himself from Mr. LEEWEN-HOECK, written at Delft 22 January 1682<sup>a</sup>; which was ordered to be translated against the next meeting.

Dr. SLARE communicated an account of a murrain in Swisserland, with the method of cure, in a letter to himself from Dr. WINKLER, chief physician of the Prince Palatine, dated December 22. 1682.<sup>b</sup> This murrain appeared in a swelling, or some blister on the tongue; which being broken with a silver instrument, and the matter wiped away, there are given the following medicines, foot, gunpowder, salt, brimstone, equal parts, and as much water as is necessary to wash it down; of which a large spoonful was a proper dose.

Mr. HOOKE shewed an experiment of raising the spirit of wine much higher than in the ordinary barometer, made with quicksilver and spirit of wine.

January 31. Sir JOHN HOSKYNs president in the chair.

Sir ANTHONY DEAN shewed the Society a large thick cake of rust, which he had taken up out of a ship, that had lain sixteen years covered with the sea at Harwich. This cake was so inclosed in the keel of the ship, that the rust falling down could not be washed away at any time with the water. It was formed from

<sup>a</sup> It is printed in the Philosophical Transactions, Vol. xii. N<sup>o</sup> 145. p. 74. for March 1682.

<sup>b</sup> It is printed *ibid.* p. 93.

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the rust of a long bolt, that fastened some adjoining timber of the ship; which bolt had been of the diameter of an inch and a half, but was now in several places almost consumed. Though the cake looked very much like iron, yet when it was tried with a magnet, it did not adhere to it.

Mr. HOOKE was of opinion, that a peculiar vinegar of the oak had dissolved some parts of the bolt, and precipitated them into the place, where they were found.

But Sir ANTHONY DEAN affirmed, that he had found iron to rust sooner in elm than in oak, and in beach than in elm.

Mr. HOUGHTON said in general, that in the preparation of powder of steel, the filings of steel being mixt with vinegar became a hard lump, which was afterwards beat in pieces in a mortar for use.

Whatever were the cause of the dissolution of the iron, and gathering in a hard lump, it was said, that Sir CHRISTOPHER WREN had found a great cake of iron, which had insensibly grown from the decay of a bar of iron, that fastened some of the stones of a pinnacle upon Westminster-hall; which cake was of so great solidity, as to raise several tons of stone out of their place, and thereby ruin the pinnacle.

Dr. PLOT sent the Society two small boxes of the following earths. First box, 1. Moyra, an earth, wherewith the Turks paint their walls of their houses. 2. A depilatory,  $\frac{2}{3}$  lime, and  $\frac{1}{3}$  orpiment, made in a cataplasm, to take away hair. 3. Beiloon, which made into paste takes away spots. It is used by the Turks in bathing to make their skins soft. 4. L'Ombra from Aleppo, used for shadowing by painters. The second box, 5. *Orpimentum nativum, quod Arabes dicunt continere aliquid simile lapidi speculari.* 6. *Terra verd* from France, used in painting, fat like *terra saponaria*, and sticking to the tongue like a bole. 7. Zaffer, used for tinging glass blue. 8. *Bolus Alpeppensis.*

Dr. SLARE observed, that this, as well as other zaffer, was not given abroad pure, but disguised with other ingredients by others, that owned the mine: that he had heard of but one mine, which was in the Duke of Hanover's territory, in a place called the Hartz: and that the name of the mineral in Dutch is *ebals*.

Upon reading the minutes of the last meeting, it being questioned, whether nitre and sand could be baked into a stone by any the hottest fire; Mr. HOOKE was desired to bring in a trial.

Dr. PLOT communicated from an unknown hand the anatomy of a monstrous pig, having no passage for the feces, nor visible sign of sex.

He also sent an account of an unsuccessful trial made at Oxford, of making an

\* Letter-book, vol. viii. p. 256. It is printed in the *Philosoph. Trans.* vol. xii. N<sup>o</sup> 147. p. 188.

infusion of rhubarb, injected into the guts of a live dog, pass coloured into the lactæ; as also some doubts, whether the holes found in the body of the broad worm were mouths, and not air-vessels \*. To which Dr. TYSON answered, that it would be difficult to have a worm of eight yards long nourished by so small a part as that supposed to be the head, where also he could find no hole with a microscope: that the worm was full of chyle, when he put it into spirit of wine; and that it presently muddied the wine, and became more empty: that he found one joint of the worm separated, and at a good distance from the rest; and yet that joint was alive and full of chyle: that the holes on the body of the worm were not so regular on each side, as the air-vessels of the silk-worm.

Part of a letter communicated by Mr. BEAUMONT was read, containing some observations of several mines near Upsal in Sweden.

A letter from Mr. LISTER to Mr. ASTON † was read, giving an account of the contents of his book, intitled, *De fontibus medicatis Angliæ: Exercitatio nova & prior*: printed at York 1682, in 8vo. Several copies of which were sent by him, and presented to the president and several members of the Society.

February 7. Sir JOHN HOSKYNs president in the chair.

Mr. HOOKE brought in a way of measuring the rise and fall of quicksilver in the barometer upon a spiral line, of which he was ordered to deliver an account in writing, that it might be considered and registered.

The translation of Mr. LEEWENHOECK's letter to Sir CHRISTOPHER WREN of January 22, 1682, was read, concerning generation from an animalcule, not an egg; the muscles of a flea, and its testicles, the worm and nymph, the sting and wings of a gnat, and its feathers; the alteration made in the blood by *sal volatile cleofm*.

A letter from Mr. LISTER with some draughts in metzotinto, dedicated to Sir JOHN HOSKYNs, was read, containing an account of a Roman altar in all its dimensions, as it was found near the river Tine in the bishopric of Durham ‡.

Some account by Monf. JUSTEL of the philosophical books publishing in France § was read.

A letter from Dr. PLOT, dated at Oxford 5 February 1682<sup>h</sup>, was read, giving an account of several philosophical matters examined by an ingenious assembly at Oxford. It was as follows:

“ The company met as usually, where first report was made, that the experiment of baking nitre with sand in equal proportions did not succeed, either in

\* Letter-book, vol. viii. p. 257.

† Ibid. vol. viii. p. 247.

‡ Ibid. p. 261. It is printed in the Philosophical transactions, vol. xii. N<sup>o</sup> 145. p. 70.

§ This is probably Mr. JUSTEL's letter to Mr. ASTON in the Letter-book, vol. viii. p. 265.

• Ibid. p. 247.

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" the baker's oven, or in a stronger heat in a crucible. The mixture, 'tis true, came to a hard concretion, but being put into water (though cold) the salt dissolved, and the sand fell into the same minute particles it consisted of before the mixture. However, it was queried, whether some other sort of sand, such as sea-sand, &c. might not answer expectation in this point, though that, which was used, did not. In fine, 'twas concluded, that this experiment must needs succeed, however, in any sand with a sufficient heat, as we see it does in vitrification in the glass-houses, &c.

" As to the chyle-like substance, whereof this lumbicus latus seemed to be full, the company desired to know, whether the animal voided it upon its being put into the spirit of wine, or whether you saw it through the transparent coat of it : And as to the quantity of slime it left in the spirit of wine, though but a little while in it, it was desired (with submission) that you would consider, whether it were necessary it should all come forth of oral passages, it being conceived probable, that this slime might come forth of all the pores of the animal in all parts, upon its being put into the spirit of wine, which being of a searching pungent nature, might easily insert itself into all the pores, and expel the slime, by separating it, both from the animal, and its parts from one another.

" The pressure of a body suspended on a spiral wire, was also considered, but that experiment was not conceived nice enough to try the difference of gravitations *in vacuo* and *in aere*. Besides it was lunted by way of objection, that springs did lose much of their restitutive power in the receiver of an air pump well evacuated, which 'tis resolved shall be tried this week by two (exquisitely made) minute watches, one to be put within, and the other to remain without, the receiver ; which if found true, 'twill be to little purpose to proceed any further in that matter.

" We failed this week also of tinging the *laſtea* with an infusion of indigo in lukewarm water, the dog having gnawn his cord asunder, and escaped before we met ; but we have gotten another which will hardly be so fortunate. The success you may expect this day sevensnight.

" To fill up the time of this meeting, one of the company gave us an account of some strange effluviæ from the body of a master of arts of his own college, which both he and some others of our company had frequently seen. This gentleman is now about 21 years of age, who, whenever he puts off his clothes in the dark, there appear sparks of fire between his shirt and his waistcoat ; whence they issue so violently, that they may be plainly heard to crackle, as sparks do sometimes from wood, and this without any friction, or other violence used.

" There was also a problem started, viz. why the arterial blood is not conveyed by a direct passage to the liver, but first through the vessels belonging to the intestines : whereas to all other secretory viscera it is conveyed directly out of the  
" aorta.

“*aorta*. The *arteria hepatica* seeming to be to the liver as the *arteria bronchialis* is to the lungs, only for the use of the particular part.

“Mr. GOULD of Wadham College brought in the draught of a prodigious polypus found in a man's heart here at Oxford, which I have sent you here inclosed with his account of it.

“The POLYPUS.

“The person, in whom we found this polypus, was a poor labouring man, a mere stranger to the town, so that there cannot be given so particular account of the symptoms he laboured under as the thing requires. He died above a year and a half ago, no relations then or since inquiring after him. If there be much heed to be given to the usual outward medical signs, he seemed to be of a melancholic constitution. As far as we could learn from the vulgar, who conversed with him in his illness, for he consulted no physician at all, the distemper he was infected with, was some fits of the falling sickness; an obstinate quartan of above a year's continuance; a deep jaundice to that degree, which is called the black, with its usual consequent, an universal settled cachexy; a sense of much pressure at his stomach (as he termed it) very great shortness of breath, with grievous involuntary sighings, prodigious palpitations of his heart, frequent swoonings. He died, according to the judgment of his attendants, in a shivering fit of his ague, with convulsions like those of the epilepsy, not without foaming at the mouth. Our design, upon this fair occasion of a body wholly at our own disposal, was to make a muscular dissection; so that a nice particular scrutiny was not made in every part affected: what appeared obvious is this, viz. a liver upon deep incisions appearing bloodless, itself throughout with a yellow gritty sandy substance, suppoied to be gall concreted by a morbid acid. The like substance of a darker hue being also in the *vesicula bilis*, his spleen only large, and of too soft loose a texture. His omentum all rotten, his stomach black with membranes extremely flaccid and thin, appearing mortified; and upon cutting of it out, though tied close, it sent forth an intolerable stench rancid scent beyond that of *aqua fortis*: his lungs were distended, and full of a purulent froth; his veins of an extraordinary bigness, particularly the jugulars, where the polypus past, were  $\frac{3}{4}$  of an inch diameter; an argument sufficient to demonstrate polypus's to be of a long growth, and not extemporary concretions made in vessels, after death, as some fancy.

“The draught of the polypus I thought to have taken off by the new way, and afterward with a pen to have perfected it something fairer than now I send it; but the attempt did not succeed: so I hope, Sir, you will pardon the sending of it thus defaced with those blots in correcting the description of it; but hereafter, if it be worth publishing, the draught may be amended. What I have written is all that occurred to my mind at the short warning I had for this description; so I hope you will excuse all faults, &c.”

*February 14.* Sir JOHN HOSKYNs president in the chair.

There

There was presented by Dr. PLOT another parcel of earths ; 1. *Terra Nilotica*. 2. *Verde viridis Cypria*. 3 A yellow mineral earth from Cyprus. 4. *Creta rubra* from France.

A present of several medals for the repository was made by Captain HADLEY.

Mr. JAGER, a friend of Mr. CHOLMONDELEY, was proposed as a good correspondent for the Society in the East-Indies ; and it was ordered, he should be written to.

Sir WILLIAM PETTY named a tincture of saffron, to be tried how it would pass into the lacter. The other colours, that were named, were litmus blue, gambogium and cochineal.

Dr. GREW remarked, that there were several things, that caused a smell and colour in the urine, when there was neither of them perceptible in the blood.

A letter from Dr. PLOT, dated at Oxford 12 February 1687<sup>1</sup>, giving an account of what had passed at a philosophical assembly there, was read, and was as follows :

“ The company being met, the method and success of the experiment on Friday upon the spring of a watch in a well exhausted receiver of an air-pump, was first discoursed of. The trial whereof was made in this manner : we took a watch and a pendulum clock both of the best reputation amongst us for going well, and set them exactly together on Thursday in the evening, and locked them up in a room for fifteen hours, that we might first know what difference there would be between them in all that time, so that allowance might be made when we come to trial of the experiment. In the morning we found them differ a minute and a half : however we proceeded to the trial, and hung the watch up in the top of a tall receiver, which being well evacuated, we locked the watch and clock up again for four hours ; then returning again, we found the watch had lost in that little time near three minutes. Then locking them up again, we returned not after till twelve hours were expired, when we found the watch had lost near nine minutes ; whence making some abatement for what the watch lost of the clock the night before, we concluded, that the watch had lost seven minutes at least. But some objections being made, upon a little bubble or two that appeared upon the hole under the bottom of the receiver, through which the air is exhausted, and the gages being sunk a little, that possibly some moisture might be gotten into the receiver (upon some defect of the stop-cock) which might affect the spring of the watch, and occasion this difference ; it was desired, that further time might be allowed for frequent trial of this experiment, hasty determinations in such nice matters being looked upon amongst us as very pernicious.

“ The same day we also tried Mr. LISTER’s experiment for tinging the lactere, with an infusion of indigo, which upon filtration being found to be no true

<sup>1</sup> Letter-book, Vol. viii. p. 278.

tincture, the liquor being transmitted clear, it was ordered, that Mr. LISTER should be wrote to, to know how he made his tincture; and that for this time a tincture of Venus should rather be used: but whether by reason of the astringency of the injected liquor, or because we waited for the event not long enough (though the dog was kept empty and fasting above two days, and 12 ounces of liquor were injected at least) there was not the least appearance of any tincture in the lacteals. However, we are not discouraged by these many disappointments, but many other tinctures are thought of, and frequent trials will be made, some whereof were ordered at this meeting.

"Then there was an account given of the dissection of the genitals of a boar made at Christmas, which animal (as they all agreed) has evidently four distinct seminal juices, and as many distinct exits for them: the exit of the prostates, whose juice is extreme clammy, and very like the gluten in the cervix uteri of pregnant cows, being a hand's breadth and more distant from the rest; and all the other exits (but that of the prostates) about the crista gallinaginis. The prostates are covered with very strong muscles to squeeze out the aforesaid clammy juice. The juice brought from the stones by the vasa deferentia was very thick and white, and the epididymides were full of the same. There are two distinct sorts of vesiculae feminales; the one extreme large, membranous, like the skin containing the spawn of fishes, which discharged a vast quantity of very thin, almost limpid, juice on the jugum of the crista gallinaginis; the other vesiculae smaller, nearer the urethra, were more thick and glandulous, yielding a thick white juice, just under each side of the crista. The penis was  $\frac{2}{3}$  of a yard long, crooked toward the end, winding about like a wimble. There is a valve just behind the exit of the prostates.

"Another of the company gave a strange relation, but a very true one, how a friend of his, a master of arts of this university, who was exceedingly troubled with deafness, had found out a remedy for it, in great measure at least, by going into the bellfry of his college on the 1st of November last, where staying for some time among the bells (which are the biggest in town) he found his hearing so well restored, that it continued with him near two months after; and decaying, he repaired to the same remedy, and recovered it again, as he constantly now does, as often as he finds that sense to fail him. The relations of Mr. BOYLE and Dr. HOLDER concerning persons, that could hear better in London streets upon the rattling of coaches, with the reasons of it, were hereupon discoursed of; but this being more considerable in divers respects, I was however ordered to acquaint you with it. Your's, &c."

Upon a discourse about the polypus found in a dissection of a man's heart at Oxford, Dr. KING mentioned his having predicted a polypus in a patient four or five days before he was troubled with it; and that he afterwards cut it out of his heart, being as big as his fist.

He also mentioned a stone, which he had found, that had stopped up the passage of the vein going into the left auricle of the heart.

Dr. TYSON mentioned his having dissected an hydropic body not quite cold, in which some of the blood let out of the veins into the thorax, as it came to cool, turned presently into a matter like that of a polypus.

Mr. HOOKE brought in a method of explaining the cause of gravity, an account of which he was to give in writing.

Feb. 21, Sir JOHN HOSKINS vice-president in the chair.

There was presented by Dr. PLOT a small box of English earths, 1. A white earth for polishing silver. 2. A very weighty white earth described in the *Natural History of Oxfordshire*, ch. 3. p. 4. 3. *Lac Lune* described, *ibid.* ch. 3. 4. A bole of Oxfordshire. 5. An earth found under Fairy-rings.

A note from Monf. JUSTEL<sup>1</sup> was read, together with a letter to him from two capuchins at Nantes, Frere TRANQUILLE D'ORLEANS and HENRY DE MONTBAZON, capucins de Louvre, dated 13 February 1687, N. S.<sup>1</sup> intimating their design of writing to the Society concerning several discoveries made by themselves in phisic and chemistry. Mr. ASTON was desired to acquaint Monf. JUSTEL, that the Society was ready to accept the offer of their correspondence; and that they needed only to direct their letter to one of the secretaries, from whom they should also receive such answers, as were requisite.

Mr. HENSHAW having been desired by the Society to peruse Mr. LISTER's book of the mineral waters in England, there was accordingly read a particular account of the contents of the book, together with several observations upon the matters there treated of; as also an intimation of some things fit to be made trial of before the Society, which were recommended to Mr. HOOKE.

1. Whether iron brush ore of the forest of Dean would answer the magnet?
2. Whether the mud and sand of the Bath-water being heated, would send forth a kind of a flame or light?
3. Whether the filings of iron, if moistened with water, will grow hot like quick lime? the truth of which experiment Dr. SLARE seemed to attest.
4. Whether red oker burnt would apply to the magnet?
5. Whether okers diluted so long till the water will no longer turn inky with galls have yet a vitriolic efflorescence?
6. Whether by means of kelp put into sea-water there be gotten a fresh potable water?

There were also some exceptions against the inflammableness of nitre, the

VOL. IV. Letter-book, vol. viii. p. 284.

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<sup>1</sup> *Ibid.* p. 280.

causing

causing of rain, thunder, and subterraneous heat, chiefly by pyrites and 'fal calcarium.

Upon the mentioning black lead to be found only in Westmorland, Mr. HERBERT said, that there was a mine of it belonging to Mr. HIEROM BAULKS, but he knew not whether it were the same.

Mr. HOOKE mentioned one in New England, and Mr. HOUGHTON one in Pensilvania, and Dr. PLOT one in Cumberland.

It was ordered, that Mr. LISTER should be desired, if he could spare it, to send up a piece of that petrified ash, which he said had the qualities of the magnet; as also some samples of ores and earths for the repository.

Upon mentioning some medicated springs to be full of pyrites, the president and Mr. AUBREY affirmed, that several, that were dug in Surrey and Kent as far as Shooter's hill, were full of pyrites.

A letter from Mr. WILLIAM MUSGRAVE of New-college in Oxford to Mr. ASTON, dated February 20, 1687<sup>2</sup> was read, giving an account of two several experiments made with two tinctures of indigo injected into the duodenum of two dogs, according to Mr. LISTER's direction; in both which experiments the lactææ appeared coloured blue in the same proportion as the tinctures themselves were to one another.

This account was ordered to be registered; and, for the greater authority, Mr. MUSGRAVE was to be desired to name the persons, who were present at his making the experiments. His account was as follows:

" I have lately repeated Mr. LISTER's experiment mentioned in the last transaction, much after his own manner, and with success: I syringed about ℥xii of a moderate tincture of indigo, without any filtration beforehand, into the ileon of a dog, which had had no meat nor water for sixteen, and but little meat for twenty four hours before the experiment, the guts again being put into the abdomen, &c. Three hours after I returned, and upon opening the abdomen of the dog (which had been kept muzzled all this while) I saw several lactæal veins of a bluish colour: they were easily seen, when the mesentery lay loose, but upon stretching it did disappear. Two days after I tried another experiment, in which I syringed ℥xii of tincture of indigo into the ileon of a lusty dog, which had been kept fasting thirty six hours before. Though my experiment did not succeed as I expected, yet I met with this observable; upon putting in the guts after I had injected the tincture, I saw four or five of the lactæals full of a deep azure liquor; which was the happy event of my tarrying longer than ordinary about sewing up the gut. I might urge several arguments from anatomy to prove, that those vessels, that appeared thus more or less blue, were really lactæals; but if I argue only from the colour it may be sufficient. Now

<sup>k</sup> Letter-book, vol. viii. p. 279.

" the

" the colour of these vessels being (in both the experiments) differing from that of  
 " the blood vessels; and there being the same differences in the deepness of the  
 " colour of the vessels that was observed in the deepness of the colour of the  
 " tincture, I am apt to think, that I do not impose on myself in this matter.  
 " There were two gentlemen of this university, who are no strangers to anatomy,  
 " and were pleased to assist me in the experiments before mentioned, and can at-  
 " test the truth of what I write to you.

" You will have a larger account of the testicles of a boar, as soon as the author  
 " of the account, already sent to you, has any opportunity to try over his experi-  
 " ment a second time.

" That some polypuses grow in a very little time may be true, but 'tis hard  
 " to think that all do so; for when a polypus is the cause of the palpitation of the  
 " heart for several years, and the palpitation increases, we may suppose, that the  
 " polypus increases also.

" The great haste, that I am in, does force me to write after an unusual manner  
 " to you, and perhaps not express myself clearly to you; but I hope you will ex-  
 " cuse, &c. New-college, February 20, 168 $\frac{1}{2}$ ."

A lump of earth being produced by Mr. AUBREY, upon trial made thereof  
 Dr. PLOT found it to be a good marl, and no better.

The experiment was made of a body poised so, as just to be covered with water,  
 which by a knock at the bottom of the vessel was made to sink more into the wa-  
 ter: an account of which was expected from Mr. Hooke.

Feb. 28, at a meeting of the COUNCIL were present

Sir JOHN HOSKYNs president

Sir WILLIAM PETTY

Mr. PERRY

Mr. HILL

Dr. PLOT

Mr. PACKER

Mr. ASTON.

Dr. KING

The speedy collecting of the arrears being considered, it was ordered,

That the bonds of Dr. THOMAS COX, Dr. JAMES ARDERNE, Dr. JOHN AL-  
 LEN, and ANTHONY Earl of Shaftesbury be put into the hands of Mr. OLIVER  
 SALISBURY, an attorney, who was desired to speak to the executor of the Earl of  
 SHAFTESBURY and to the other three persons, and upon their refusal to pay him,  
 immediately to desire an appearance of the three persons, and put their bonds in suit  
 in the most expeditious way possible.

It being mentioned, that the Society wanted experiments at their ordinary meet-  
 ings,

ings, Dr. TYSON and Dr. SLARE were proposed as persons very fit to assist the Society in that work, and unanimously accepted. Whereupon it was ordered,

That Dr. TYSON assisting the Society this year in making anatomical dissections and observations, and Dr. SLARE in making chemical and other experiments, shall be rewarded each of them at the end of the year with a piece of plate to the value of 20*l*.; and that the expences, which they shall be at in making experiments, shall be allowed them, as is usual to other curators.

It was mentioned, that Dr. TYSON and Dr. SLARE would so settle the business among themselves, that the Society at every meeting should never be without an experiment from one of them.

A proposal being made, that the mathematical instruments or engines, which had at any time been made by the Society, or given to them, as also the apparatus made use of in the making experiments, might be taken an account of, brought together, and carefully preserved; it was ordered accordingly,

That Mr. HOOKE be spoken to, that he give the best account he can of them at the next meeting of the council, there being many of them said by the president to be laid together in an upper room.

Mr. ASTON having proposed, that he might have authority to buy up any small new book for the Society, or other necessities for the execution of his office, or small presents for his correspondents; it was ordered accordingly, and that he should be repaid his expences by the treasurer.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs president in the chair.

Upon the burning a pyrites, as described by Mr. LISTER, the powder was found to apply very well to the magnet.

A letter from Monf. MARIOTTE to Mr. ASTON, dated at Paris February 23. 1687. N. S.<sup>1</sup> was read, giving an account of some new books printed there; as also of some observations of CASSINI upon VENUS, and of Monf. VARIN about the necessity of shortening the line of the pendulum, beating a second in places near the æquator  $\frac{1}{4}$  of a Paris inch.

Upon speaking of the Paris foot, Mr. FLAMSTEAD being said to have it made, it was desired, that the Society might cause one to be made after his model, to be kept in the repository.

In the same letter of Monf. MARIOTTE, a demonstration having been mentioned, how the length of the pendulum at Paris being 3 feet  $8\frac{1}{2}$  lines should near the æquator be two lines less, and near Spitzberg one and  $\frac{1}{2}$  longer, upon the sup-

<sup>1</sup> Letter-book, vol. viii. p. 285.

position.

position of the diurnal motion of the earth; it was queried by Mr. HALLEY, what position, as to the meridian, their pendulum vibrated in: as also what height from the sea; he having been forced at St. Helena to contract his pendulum, being then at the height of 400 toises; which he took to proceed from the decrease of the gravitating power at that height from the sea.

A letter of Dr. PIR of Oxford to Dr. PLOT<sup>m</sup> was read, giving an account of some trials made with a magnet upon several preparations of *crocus martis*, some of which applied very well to the magnet, and others not: as also of a child of eight months old having the dura mater in all parts firmly fastened to the cranium. The letter was as follows:

"I communicated your last to the company, who own themselves much obliged to you for the information you gave at the last meeting: but we cannot think we have yet merited so far, as the public notice of the Society, and desire only their pardon, or at most a favourable acceptance of those little things we can hence present you with. Mr. MUSGRAVE and Mr. PACKER, &c. who made the experiment of tincture of indigo, are fully satisfied, that they saw it in very many of the lactææ, but they intend to make further trials of that kind, and design a more perfect account, than they can at present present you with. We made a few experiments of *crocus* of steel applying to the magnet, and *crocus* from the distillation of *sal armoniac* on filings: the *crocus cum sulphure*, readily applied to the load-stone; but especially *tart. chalybeat.* though the metalline parts had been so far divided by the tartar, as to pass through the paper filtre: but the *crocus* from the distillation of *sal armoniac*, after it had been some time in a strong fire, and the *crocus martis ashring.* (calcined in a reverberatory) did not take the least notice of the magnet, and yet we doubt not but these *crocuses* with fluxing powder may be reduced into steel. These little trials are of some use in medicine, but whether they may be to any advantage compared with Dr. LISTER's observatory, we refer to you. I am confident there is no black lead found in Dorsetshire; you may have flint and chalk enough there, but nothing like that mineral. I saw the dura mater in a child of eight months old firmly in all parts fastened to the cranium. The impressions frequently seen in the *ossa scincipitis* of the arterial branches, where the dura mater was, as usually disengaged from the skull, make it probable it had been affixed to it. But of this I desire you to enquire: your answer to it, and a further account of what shall be the next week observed by the Society, will very much oblige us, particularly, &c."

March 7, Sir JOHN HOSKYNs president in the chair.

There were presented from Dr. PLOT four more earths, viz. 1. Tobacco-pipe clay from Shotover. 2. Some yellow oker from Shotover. 3. Clay yellow oker from Shotover. 4. Terra lapidosa found between Thame and Kinley in Oxfordshire.

<sup>m</sup> Letter-book, vol. viii. p. 288.

Three earths were likewise sent to the Society by Mr. FLAMSTEAD, which had been found in digging a well at Greenwich. They seemed to be all clay, though of very different colours.

A letter of Mr. GOULD to Mr. ASTON, dated at Wadham college in Oxford March 6, 1683,\* was read, mentioning, that a tincture of stone-blue appeared fresh not only in the lactææ, but also in the *receptaculum* and *dustus thoracicus*: that the same tincture with an acid turned into a lively red, but with an alkali the blue was more intended: that a vial filled to the neck with oil of vitriol mixt with a little water continued to run over several days together: and that oil of tartar *per deliquium* falling on a deal shelf was in some time covered with a perfect nitre.

This occasioned a discourse concerning aerial magnets; oil of vitriol drawing water out of the air; and calc's growing heavier in the air; Dr. SLARE remarking, that phosphorus after burning increas'd above four times its own weight.

In a discourse about salts it was propounded by Mr. HENSHAW, whether any person could make it appear, that salts, which had never been in the fire, would by mixture together produce an actual heat.

A letter of Mr. LISTER to Mr. ASTON, dated at York March 3, 1683;† was read, containing an answer to some objections, that had been made to some passages in his book about mineral water. It was as follows:

“ Objections fairly put are, and will be ever, welcome to me; but if studiously made to beget discourse, I am an enemy to them, and shall decline answering them, because they hinder a man's own thoughts and tire him, like a great dust raised in a sandy road, that blinds a man rather than promotes his journey. And indeed one is apt enough to raise dust of himself, for there is yet little enough, that can be discours'd of in natural philosophy, but is too liable to objections. However I will tell you what I think of those you sent me, though they may be answered, and are so in a great part in the book.

1. “ Nitre is not of itself inflammable; if it be meant of salt-petre, melted in a crucible, it is true, but if the same be cast into the naked fire, it is otherwise, for it flames readily. Thus brimstone itself is to be melted and kept so inflamed: but it serves my turn to distinguish betwixt the two nitres, that salt-petre is inflammable in a naked fire, and that rock-nitre is not so, however managed. Besides the essential difference of the crystals, if it be meant, that salt-petre will not take fire of itself, nor will rock-nitre; but if the vegetation of this latter be hot, which I think I have sufficiently proved, it is enough for my purpose.

2. “ That the pyrites need not be so much concerned in rain: it is less concerned in rain than rock-nitre, because it is infinitely less in quantity, because

\* Letter-book, vol. viii p. 293.

† Ibid. p. 292.

“ the

“ the greatest part of the mountains are of lime-stone : but if it be true, that all  
 “ springs and waters vaporate or send forth a humid vapour upon the account of  
 “ vegetating salts, which I think I have proved, then is the rock-nitre much  
 “ concerned, as also the pyrites, and I will not say but also vegetating salt too.

“ But I cannot solve thunder showers without a vapour from the pyrites : and  
 “ much more I could say, if it were convenient to anticipate my papers, to  
 “ prove it.

3. “ That nitre and other things besides the pyrites and lapis calcarius may be  
 “ the causes of subterraneous heats, &c. agreed : but it must be remembered,  
 “ that the baths of England are my task only. As for nitre, if it be meant salt-  
 “ petre, I think it will not be proved, that there ever was found of it in the  
 “ bowels of the mountains, but only where men and beasts have frequented. And  
 “ in springs, where it is not naturally found, it is far from me to suspect it as a  
 “ cause. As for Borelli, I never saw the book : but I am apt to believe the py-  
 “ rites a sufficient cause of the inflammability of all the vulcanos of the world,  
 “ for that all the other *metalla inflammabilia* are very small and inconsiderable, if  
 “ compared to it ; and God forbid they should be otherwise, being many of  
 “ them pernicious poison, and therefore providentially little and rare.

“ I do purpose to print the 2d part some time this year, if I live, and then I shall  
 “ endeavour to give what satisfaction I can to such reasonable objections as shall  
 “ be fairly put.

“ The book is to ill printed, for want of letters and a corrector, that I am  
 “ ashamed of the little impression I made here : however I have sent them all up  
 “ to Mr. CHURCHILL to dispose of them as you shall order, there being not above  
 “ thirty left undisposed of.

“ I have likewise sent up in the same box the copper plate of the altar, and  
 “ desire only a hundred fairly printed off to be reserved for me to be put to a  
 “ book I intend, and then the plate is at your service : it will print well and long  
 “ enough, being a rough ground, especially if care be taken, that the ink be all  
 “ well and firmly ground, otherwise these kind of plates, are soon spoiled. I re-  
 “ commend you to Mr. P. TEMPEST in the Strand to get it well printed, for  
 “ myself and you.

“ You may command what earths I have by me, and any thing else to facili-  
 “ tate the experiments designed ; but I desire you would particularly name them,  
 “ and the circumstances you desire to be informed of, &c. York March 3,  
 “ 1682.

A letter of Monf. JUSTEL to Mr. ASTON, dated March 5, 1681,\* was  
 read, mentioning new relation published by monf. REZOLET of the western parts  
 of America from Canada to the gulph of Mexico ; as also giving an account of

\* Letter-book, vol. viii. p. 296.

mortar-pieces cast at Paris, ready fixed to the angle of forty five degrees, which could be so managed by proportioning the powder, as to throw a bomb to any distance within 1300 toises. This letter took notice likewise, that the pretended contrivance of rendering wood incombustible was found to be a cheat.

Dr. SLARE brought in a vitrified substance made of half an ounce of petre to an ounce of sand, being a trial of something, that had been said of petre and sand baking into a stone.

Dr. SLARE communicated an account of some experiments sent by Dr. PIT about the force of a loadstone upon several crocus's, and other chemical bodies, made out of iron.

He also shewed the *crocus cum sulphure*, to apply to the magnet: but the *crocus martis restringens*, made in a reverberatory fire, not to yield to it at all.

March 14. Sir JOSEPH WILLIAMSON in the chair:

A gentleman of Prussia, at the desire of Mr. HAAK, had leave of the Society to be present.

An account being given of Dr. PLOT's having examined some earths sent at the last meeting by Mr. FLAMSTEAD, which the Dr. found to be different marls, Sir WILLIAM PETTY took occasion from hence to move, that the *criteria* or distinguishing qualities of several natural things might be so agreed on, that there might be no ambiguity in the terms. He inquired particularly what was the notion of marl, fullers-earth, clay, &c.?

To this Dr. PLOT answered, that he thought clay might be distinguished by its not dissolving in water; and that therefore it was commonly ground of bogs:

That marl had always a greet mixt with it:

That fuller's earth was without greet:

That loam is an earth fit for making bricks, which will not crack in the fire:

That chalk is injured by being wet, and becomes unfit to score:

But that oker scores better and firmer for being wet:

That free-stone has no flates nor grain: that it will cut uniformly, and not easily break to pieces as marble: that it is softer in the quarry than put: that it will saw without sand and water.

Dr. PLOT was then desired, at his leisure, to draw up a farther account of these and other things of the like nature, and send it to the Society.

Mr. HOOKE

Mr. Hooke distinguished stones into those, that had a bituminous and sulphureous cement, and those, that had a saline :

That the bituminous burnt to lime :

But that the saline turned hard :

That marble was a bituminous, but Portland stone a saline :

That loam was a mixture of sand and clay :

That clay was fittest for making bricks ; and so used by the Romans ; but required a long time for the making them : that the clay must be laid open to the air and frost to have the body of it opened :

That stones, that are flaky, ought to be laid in the building as they lie in their bed ; else they will be apt to moulder and decay :

That some stones, that cut firm, yet by lying in the air, dissolved, seeming to be made of a vitriolated salt.

Dr. PLOT being said to have twenty two sorts of iron ore sent him out of Suffex, Sir WILLIAM PETTY remarked, that a criterion of them, and of all iron, was, that, if they are a little calcined in the fire, they stick to the tongue.

Upon reading the minutes of the last meeting, wherein was mentioned the tinging of the lactææ with stone-blue, Sir WILLIAM PETTY took notice, that the passages into them must necessarily be very large and open, since they received so gross a body : that he conceived it to be smalt, which appears to the eye very rough upon painting : and that indigo being but a *secula* was not proper neither : for which reason he preferred liting and violet, that had been formerly mentioned for blues :

The words *considerably bigger* having been used in some things, that were read, Sir WILLIAM PETTY cautioned, that no word might be used but what marks either number, weight, or measure.

A letter from Mr. GOULD to Mr. ASTON, dated at Wadham-college in Oxford, March 13, 1687<sup>1</sup> was read, giving an account of a trial made of the attraction of oil of vitriol in glasses of different mouths. The first glass, the mouth having  $\frac{1}{2}$  an inch diameter, weighed with the liquor 43. 13. 36 gr. but after having stood a week weighed 43. 33. The second glass of rectified oil of vitriol *per se* having the opening three inches diameter, and weighing 15. 13. 41 gr. after it had stood a week, was increased in weight 73. 25 gr. so that the alteration was something after the proportion of the diameter of the vessels.

<sup>1</sup> Letter-book, vol. viii. p. 303.

Mr. Hooke observed, that things, which had suffered the fire, were apt to attract.

Upon mentioning the attraction of nitre by oil of tartar, Sir WILLIAM PETTY recommended to the Society the distinguishing of chemical salts by some sensible mark, such as the rising of spirit of wine seven, eight, or ten inches to a flame, and ordinary aqua vite not above an inch.

Mr. Hooke said, that he took volatile bodies to be such, as mixt easily with the air: that the more easily they mix, so much the more volatile they are. He named three degrees of them; some, that mix with cold, some with a tepid, and some with a very hot.

Fixed bodies he understood to be such, as will not mix with the air.

It being queried at the last meeting, whether salts not having suffered the fire, would heat by being mixed;

Mr. Hooke mentioned brass lumps found in cole-pits, being a kind of vitriolate salt, which have been said to take fire by rain and weather, burning the houses, where they have been laid.

He also named fermenting substances, such as hay.

Dr. Plot named a stuff called lam, lying among the shale of cole-pits, which being mixed with water and other substances there found, sets the pits on fire, though no person had worked there for a long time.

Upon mentioning in the minutes French mortar-pieces shooting 1300 toises, it was queried, whether the force of powder would not put the out fuzée: as also whether grenados shot in a short gun by one of the King's gunners, was not the invention of Sir WILLIAM PETTY about eight or nine years before.

Dr. TYSON was ready to exhibit the anatomy of a worm, which was deferred, as the time was too far spent.

Mr. Hooke brought in an experiment for proving an attraction from the surface of a glass of water to the place struck with a fiddle-stick on the side; an account of which was directed to be brought in.

Dr. Plot shewed a parcel of legumina and other grains brought from the Indies; the names of which were Surinam pease, clay pease, East-India maiz, black speckled pease, East-India kidney beans spotted red, cashou, a black-eyed pea, Jamaica pease, a large flat white bean, the red pea, a large black spotted pea.

Sir WILLIAM PETTY mentioned an opinion of some men, that fresh salmon would

would stink by being carried through a field of beans at the time when they are blossoming: but the truth of it was very much doubted.

March 21. Sir JOSEPH WILLIAMSON in the chair.

Upon reading the minutes of the last meeting, which mention iron ore's sticking to the tongue, after having suffered fire;

The same quality was asserted to be in several boles, in many of which Dr. SLARE was of opinion, there is iron contained.

Upon mentioning some things, that had been formerly treated of by the Society, it was recommended to the council to consider of a way of making a general index, like a concordance, to the journals and register-books of the Society; for the doing which it would be necessary to frame a dictionary of such words or heads, as are to be inserted into the concordance; as also to look over the journals and registers, and to rectify them, if there be occasion.

A letter of Mr. GOULD to Mr. ASTON, dated at Wadham-college March 20, 168 $\frac{1}{2}$ \* was read, mentioning the easy flaming of the steams, which arise from the pouring oil of vitriol upon filings of steel, when a candle is applied to them. Upon which Dr. SLARE was desired to prepare the same for the next meeting.

In the same letter was a fuller account of the imbibing of the moisture of the air by oil of vitriol. The quantity of the oil of vitriol at first was but 6  $\frac{1}{2}$ . 6 gr. but the increase in a fortnight's time was 113. 5 gr. over and above.

A letter from Dr. PLOT was read, containing an account of a monstrous birth of one TAYLER of Heywood in Staffordshire; the monster itself being promised to be sent to the Society at their next meeting. In the mean time there was read a letter of Mr. SAMPSON BIRCH of Stafford to Mr. WALTER CHETWYND of Inglistry giving him a particular information of the matter of fact.

The Society not doubting of the sincerity of Mr. BIRCH, but being not over credulous of strange stories, Sir ROWLAND WYNNE undertook to write to Sir CHARLES WOLSELEY about it, as living near the woman, who produced the monster, and having been formerly her master.

Dr. SLARE produced a phosphorus, which had formerly shined for five or six hours *in vacuo Boyleano*; but then being extinct it could never be brought to shine again by any extraordinary heat applied to it, but had continued dark for about five months.

The vacuum was tried by breaking one end of the glass under water, and proved good.

\* Letter-book, Vol. viii. p. 309.

There was also shewn a phosphorus in water, which darted flashes through the water like lightning : upon which was read an analogy between common lightning and the phosphorus<sup>1</sup>, they seeming to agree in many particulars.

1683. *March* 28, at a meeting of the COUNCIL were present

Mr. COLWALL vice-president

Mr. HENSHAW

Mr. MERIDITH

Mr. PACKER

Mr. PERRY.

Mr. HILL

Mr. ASTON.

The arrears of Sir JONAS MOOR and Mr. THOMAS BARRINGTON being upon bond, were ordered to be demanded of their executors.

The council having taken notice, that the journal books of the meetings of the Society, which have been written since 1677, have several vacancies in them, omissions of things and names, and mistakes; it was ordered,

That any three or more of the council, then present, or of any other members of it for the present year, be a committee to meet at the repository, and inspect the journal books, to note any vacancies, omissions, or mistakes; or, Mr. HOOKE being present, to mend them, and supply them, with his consent or opinion, and on just occasions alter and strike out such places or passages, as he and they shall agree to; and in case of disagreement, make report to the council, that they may take farther order therein: and if the omissions and vacancies be such, as could not be supplied, then to draw lines there in void spaces, that for the future there may be no new thing written therein.

At a meeting of the SOCIETY on the same day, Mr. HENSHAW vice-president in the chair.

A letter from Mr. GOULD, dated at Oxford, March 27, 1683, was read, mentioning an experiment made there by steeping true English slate in water, and mixing with it the infusion or powder of galls, to see, whether it would turn ink. This succeeded according to expectation, and seemed of good use, both for distinguishing the true slate, and finding out the mineral, which probably makes it so good a medicine.

Upon discoursing concerning Irish slate, Sir WILLIAM PETTY remarked, that there were two sorts in Ireland; the one more strong or slaty, found at Slane in the county of Meath; the other an earth or bole, being blacker and less slaty than the former, tasting something aluminous, and being found near some places, which afford alum. This being the best is found in Kerry near Armagras.

It was recommended to Dr. SLARE to try the experiment abovementioned before the Society at their next meeting.

<sup>1</sup> Dr. SLARE's account of his experiments on this subject is printed in the Philosophical

Transactions, N°. 150. p. 289.

Mr.

Mr. GOULD's letter contained likewise a trial to separate the acids from the mercury in mercurius dulcis, by spirit of sal armoniac, upon which the mercury appeared in a black form. This experiment was represented as of good use in cases of poison by sublimate, and for the subduing acid juices in the body.

This experiment was recommended to Dr. SLARE to be made by him.

In the same letter was a farther account of the addition to the oil of vitriol this third week; which (the liquor being now very weak) was but one drachm twenty grains; but the increase in the whole above treble the first weight.

Upon this Dr. SLARE gave an account of his having exposed in a broad glass six drachms of oil of vitriol, which after eight hours weighed one drachm thirty-two grains more. After 32 hours it had gained three drachms and a half above the first weight: and this was done, the room being very close, and the air very dry.

This experiment, though the additions after three weeks were not expected to be considerable, was thought fit by Mr. HENSHAW to be farther carried on by an inquiry into the nature of the compounded liquor, whether the increase would prove a salt or a phlegm. He proposed the distilling it *in balneo*, and some other ways, whereby a nitrous salt would be made to rise before a vitriolic.

Dr. PLOT sent a farther relation of the monstrous birth in Staffordshire, as it came to him in a letter from Mr. SAMPSON BIRCH, alderman and apothecary of Stafford\*, together with the substance itself, which was to be shewn the Society, and then sent him back.

This substance appeared much the same, as was described. It was ordered to be left in Dr. TYSON's hands to make some observations on it, and to get the figure of it taken.

Two letters to Mr. ASTON were read, the one from Mr. ANDREW BORCKMAN, dated at Hamburg March 16, 1683\*, inclosing another from JOHN ERIC OLHOFF, secretary of the republic of Dantzick, dated there February 1, 1683\*, giving notice of the latter's having sent the Society for themselves and some others a present of a book published by himself, containing the judgments of several learned men in Europe upon the performances of Mr. HEVELIUS in astronomy.

A letter from Dr. LISTER to Mr. ASTON, dated at York March 26, 1683\*, was produced, containing an account of an hydrophoby in a man bitten by a mad dog; which letter was referred to the next meeting.

\* Two letters of his to Dr. PLOT, one dated Feb. 1, and the other Feb. 28, 1683, are inserted in the Letter-book, vol. viii. p. 330 and 333. An extract of them is printed in the Philosoph. Trans. N° 150. p. 281.

† Ibid. p. 312.

‡ Ibid. p. 313.

§ Ibid. p. 314. It is printed in the Philosophical Transactions. Vol. xii. N° 147. p. 160. for May 1683.

Dr. TYSON read a large discourse concerning the *Lumbricus latus*<sup>a</sup>, consisting of several observations of his own, and a refutation of several errors maintained at several times concerning it.

Mr. HOOKE was ready to bring in a magnetical experiment; but it was deferred till the next meeting.

Mr. HUNT presented for the repository a large shell of an echinus marinus from a friend of his.

April 4. Mr. HENSHAW vice-president in the chair.

Mr. HOOKE exhibited an experiment tending to explain magnetism :

There were two flat pieces of wood like rulers, the one having a pin fastened in the middle; the other was in the middle suspended by that pin like a needle of the compass. By knocking gently on the end of the lower piece of wood, the upper piece moved towards the line of knocking, or not a quarter of the compass from it. The application of this experiment was not declared.

Mr. WALLER shewed some rough sapphires, which strongly adhered to the magnet.

It was much doubted, whether those substances be what they are sold for; and it was desired, that an inquiry be made of Mr. RALPH BOX concerning them.

Dr. SLARE made a trial of Irish slate, tinging with galls, but not applying to the magnet, though after burning.

He also made a trial of the taking fire of the fumes of oil of vitriol and filings of steel.

The filings of steel, with a little water poured on them, did not heat sensibly to the touch.

He gave an account, that the oil of vitriol mentioned at the last meeting, was now increased to fourteen drachms seventeen grains.

A letter of Mr. WILLIAM MUSGRAVE to Mr. ASTON, dated from New-college, Oxford, March 3, 1683<sup>b</sup>, was read, mentioning, that Dr. WALLIS had lately met a remarkable piece of antiquity, which was the date 1133 in figures, on an old mantle-tree at the minister's house at Helmdon near Brackley in Northamptonshire.

That he had tried whether a tincture of the stone hæmatites will tinge with galls, but without success.

<sup>a</sup> It is printed in the Philosoph. Transact. N° 146. p. 113.    <sup>b</sup> Letter-book, Vol. viii. p. 323.

That Mr. WELSTEAD of Merton-college, and himself had injected one drachm of gutta gamandra, dissolved in warm water, into the axillary vein of a lusty young dog, which had been kept fasting thirty-six hours before : that as soon as the dog was untied (which was as soon as could be) he was so uneasy, that he laid down and employed his whole endeavours in breathing, which he did as fast as possible for a quarter of an hour, at the end of which a blue thin matter came from him *ab ano* ; and he breathed with difficulty a quarter of an hour longer, and then died. Being opened, the meseraic veins were found distended to double their usual size ; and the blood appeared thinner than ordinary, and not so apt to coagulate as usual.

That Dr. MERRYWEATHER, practitioner of physick at the Devizes, had sent an account of a woman in that neighbourhood, who was cured of a tympany of eight years standing by an onion diet.

Mr. LISTER's observations on a case of hydrophoby were read.

April 11, Mr. HENSHAW vice-president in the chair.

Monf. BENJAMIN DE BROECKHUYSEN, a physician of Holland, being permitted to be present, gave the Society two copies of his book *de oeconomia corporis animalis juxta methodum philosophiæ Cartesianæ*.

There were presented from Dr. PLOT the following specimens ;

*Lignum fossil* from Nidlington and Ductington in Oxfordshire.

Blue Oker to colour gloves from Darlaston in Staffordshire.

*Creta rubra* from Hinkley in Staffordshire.

Rubrica from Ipston in Staffordshire.

Yellow Oker from Willen-hall in Staffordshire.

Mr. PAYNE presented likewise some pieces of urns both of earth and glass, with a stone ring found therewith.

An extract of a letter from Monf. ANDREW ARNOLDUS to Mr. HAAK, dated at Paris 6 April 1683, N. S. <sup>b</sup> was read, mentioning, among other things, that his father at Nuremberg had lately received some Bohemian mushrooms, which in dressing seemed petrified, but were found to contain some of them nine, and others twelve grains of fine silver.

It being queried, whether these mushrooms were like those of England, Dr. SLARE said, that they were.

Another sort, common in Germany, being dried and strung, keep the year round, and are good for eating.

Upon mentioning the inscription in Indian figures, *anno* 1133, Mr. HENSHAW

<sup>b</sup> Letter-book. Vol. viii. p. 325,

remarked,

remarked, that this sort of figures were first brought from the Moors by POPP SYLVESTER II. who had long studied in Spain, though they were not in common use till long after.

Mr. HOOKE brought a draught in perspective of a square said to be equal to a circle.

April 18, at a meeting of the COUNCIL were present

Mr. CREED	Mr. COLWALL vice-president,
Mr. HILL	Dr. GREW
Dr. KING	Mr. PERRY
	Mr. ASTON.

Mr. EDWARD HAYNES and Mr. WILLIAM GOULD being recommended as candidates (together with some others) the council approved of the two named, and ordered them to be proposed to the Society at the next meeting, as persons capable of being elected fellows.

At a meeting of the Society on the same day, Mr. HENSHAW vice-president in the chair :

There were presented by Dr. PLOT the five following earths ;

*Talcum Staffordiense*, amblicot clay from Stafford, fit to make pots for glass-houses.

*Terra saponaria Comberferdiensis*, in Staffordshire.

Earth of Lawton park in Staffordshire, in which filings of iron, wrapt up and melted again, make a purer sort of iron than before.

*Terra Anglica ignota*.

*Bolus Harborensis* in Staffordshire.

Mr. HOUGHTON brought in a bundle of seeds of different sorts, which he had collected towards the furnishing a particular thesaurus of seeds in the repository.

He having consulted Mr. Box about the sapphires mentioned at the meeting of April 4, was informed, that they came all from Lyons in France.

But there being little answered about smalts, Mr. HOOKE said, that out of a copper mineral calcined and powdered, and mixed with sand, is made a bluish glass, which being quenched in water, cracks and crumbles into a fine blue powder.

Mr. CLUVERUS and Mr. PERRY were desired, either of them, to read over Monf. DE BROECKHUYSEN's *Oeconomia corporis animalis*, and give some short account of it.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college April 17, 1683\*, was read, concerning the nitron of Egypt, which, he was informed, has

\* Letter-book, Vol. viii. p. 326.

ice on the top of some of the rivers of that country. It was brought from Egypt by Mr. HUNTINGDON, and given by him to Dr. PLOT, who presented some of it to Mr. MUSGRAVE, who thought it to be a sort of sal armoniac.

Mr. HENSHAW desired, that Dr. PLOT would send the Society some of it, it seeming in PLINY to be only a nitre, and being accompanied with such a yellowish oil as that is.

Mr. MUSGRAVE's letter mentioned likewise his having seen the famous febrifuge of THOMAS CORNELIUS CONSENTINUS, much resembling *antimonium diaphoreticum* as to its colour, and altogether insipid as that.

It mentioned likewise the case of a girl dead with the palsy.

An experiment formerly shewn the Society by Mr. HENSHAW was again exhibited, of a bar of iron having a different direction or polarity, as either end of it is turned to or from the earth.

This occasioning some discourses about magnetism, Mons. JUSTEL affirmed, that he had seen a peculiar sort of load-stone, which being struck on an iron both backward and forward, first forward, and then backward, did not destroy its magnetism, as others usually do.

Mr. HUNT presented from Mr. TAYLOR a very large saw of the priftis.

Mr. EDWARD HAINES and Mr. WILLIAM GOULD having been mentioned to the council, were proposed to the Society for candidates; the former being recommended by Mr. FLAMSTEAD and Mr. HALLEY, and the latter by Dr. PLOT.

April 25. Sir JOHN HOSKINS president in the chair.

It was desired, that a more full account of the experiment about the magnet, shewn at the last meeting by Mr. HENSHAW, might be taken, and entered into the Register-book\*, which was done as follows:

" Mr. HENSHAW, at the desire of some of the Society who had not seen it, brought a magnetical experiment, which he had many years before shewn in the same place; which because it is surprising, and has been heretofore known by very few, he was desired to bring in an account of what he had exhibited, in writing.

" The experiment was this: he took a piece of iron of a foot length, broad about  $\frac{1}{2}$  of an inch, and thick about  $\frac{1}{4}$ , that had never been touched with the loadstone, though any piece of iron of any length and figure will have the same effect. Holding this piece of iron erect or perpendicular to the horizon, he applied a versorium, or magnetical needle to both the ends of this piece of

“ iron, In this position, the north end of the needle always turned to that end of  
 “ the iron, that was uppermost, and the south point of the needle to that end of  
 “ the iron, that was held downwards; and changing as often and as fast as he  
 “ could the position of the ends of the iron, as turning that end which was first  
 “ uppermost to be lowermost, and that which was lowermost uppermost, the  
 “ needle had no particular regard to either of the ends, but still turned the north  
 “ point to that which was uppermost, though it had just before turned south to it,  
 “ when that end was lowermost. This phenomenon he leaves to be discussed  
 “ by those of better judgment, whether it does not confirm the opinion of Dr.  
 “ GILBERT, that the whole globe of the earth is a great magnet; and of Mous.  
 “ DES CARTES, that the magnetical effluvia of the earth are carried in certain  
 “ lines from one pole of the magnetism to the other.

“ He further shewed, that there was a very great latitude as to the erection of  
 “ this iron to almost any angle to the horizon, wherein the needle performed its  
 “ part with the same constant respect; but if the iron were held parallel to the  
 “ horizon, the needle had no regard to either end of the iron, nor any respect to  
 “ the whole body of the iron, when applied to it in an horizontal position; and yet  
 “ when the iron is held in a perpendicular position, if the needle be applied to it,  
 “ and removed gently and gradually from the bottom to the top, and, *vice versa*,  
 “ the needle will stand east and west, or at right angles to the iron, when the needle  
 “ is brought a little beyond the middle of the iron. And he thinks it a notable  
 “ confirmation of the above-mentioned theory, what Mr. EDMOND HALLEY  
 “ (who had formerly seen this experiment) affirms, that in the island of St. He-  
 “ lena, the needle turns its south point to the uppermost or erect end of the iron;  
 “ whereas in our northern hemisphere, it constantly turns its north point.”

A letter from Dr. PIR to Mr. ASTON, dated at Oxford April 25, 1683<sup>1</sup>, was read, desiring, that some of the Egyptian earth, being in the Society's repository, might be weighed constantly every fortnight till the 17th of June, and the several weights set down, in order to the comparing them with the like trials at Oxford.

This letter contained likewise an account of two optic nerves found by Dr. PIR in each eye of a jack, and formerly in those of a barble, of which he intended to send a farther account.

A letter of Mr. LISTER's to Mr. ASTON, dated at York April 23, 1683<sup>2</sup>, was read, giving an account of his having sent to the Society several samples of minerals relating to the history of iron. They were in number twenty-four, and the greatest part of them calcinations; but he offered some crude, if the Society should desire them.

Mr. ASTON was desired to accept of that offer, and to inquire of him what observations he had made about bras lumps; whether they take fire in moist weather? whether his Indian iron came from Golconda? whether he knew of a rock in Yorkshire stuck over with large nautilus's?

<sup>1</sup> Letter-book, p. 334.

<sup>2</sup> Ibid. p. 327.

Dr. SLARE showed a piece of brown oker, which after ignition being placed on the ground plainly attracted the needle, that was applied to it.

He farther observed that end of the oker, which was towards the ground, to draw the south pole, and its opposite the north pole; as also, that the yellow oker gains no polar verticity this way, though it turns red after it has been burnt in the fire, as the pyrites, and other iron ores are observed to do.

He gave a farther account of oil of vitriol exposed to the air twenty-five days before: That the last five days it had gained but forty-two grains: That the liquor tasted subacid, like a weak flegm of vitriol: That oil of vitriol gains in eight days of very wet weather but half a drachm more than in seven of dry and very hot weather; which is very inconsiderable.

May 2. Sir JOHN HOSKYNs president in the chair.

A box of iron ores being presented by Mr. LISTER, the greatest part of them calcined, were now examined by a good magnet; as black lead, gur, yellow oker, brown oker of the Spaw, golden pyrites, mundic, Suffu ball mine, Derbyshire blue iron, Virginia iron stone, red emery, black emery, East-India iron ore, Swedish iron ore, petrified wood, or pyrites from Lough Neagh in Ireland, the earthy contents of Malton Spaw: All these cleaved to the loadstone.

Upon mentioning Dr. PIR's having discovered two optic nerves in the eye of a barble and pike, it was recommended to Dr. TYSON to examine the eye of those fishes, and report how the optic nerves ordinarily appear.

Mr. ASTON read a discourse of WILLIAM BRIGGS, M. D. and fellow of the college of physicians, being a continuation of his discourse about vision<sup>a</sup>, read formerly before the Society; wherein were answered several objections, which had been proposed against his theory; and some farther argument urged in confirmation of it.

Mr. CLUVERUS gave an account of Monf. DE BROECKHUYSEN's *Oeconomica corporis animalis*.

Mr. GOULD and Mr. HAINES were elected fellows of the Society.

May 9. Sir JOHN HOSKYNs president in the chair.

A piece of the nitron of Egypt, sent by Dr. PLOT, was presented to the Society; as also some sand of that country, taken from a place not covered with the Nile.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, May 8, 1683<sup>b</sup>, was read, giving an account of his having cut out the cœcum

<sup>a</sup> This continuation is printed in the Philosophical Transactions. Vol. xii. N<sup>o</sup> 147. p. 171. for May 1683.

<sup>b</sup> Letter-book. Vol. viii. p. 335. See Philosophical Transactions, N<sup>o</sup> 151. p. 324, for September 1683.

of a bitch ten days before with so good success, that the bitch was very likely to continue lusty and well.

Dr. TYSON remarked, that the cecum of a bitch and several other animals was small and full of glands, but without excrements; but that it was contrary in a rabbit, and some others.

The same letter mentioned a tincture of hæmatites not turning black upon an infusion of galls.

An account of the magnetical experiment, shewn by Mr. HENSHAW, was read, and ordered to be registered.

Dr. TYSON shewed the figure of the inward parts of the polypus, wherein were remarkable the beak like a parrot's, with strong muscles to it; a large globous liver, and the gall contained in the *vesica fellea*, which was perfectly black, so as to be made use of instead of ink; with other particulars relating to the stomach, ovarium and acetabulum.

Dr. SLARE brought in the chemical analysis of the urine of a healthy man after drinking plentifully of wine and other strong drinks. There was no vinous spirit: the first thing, that ascended, was an insipid liquor like a flegm. There were two sorts of salts shewn, the one seeming a marine, by other qualities, as well as the figure.

He was desired to communicate a copy of the process, in order to its being registered.

Dr. WILHEM TEN RUYNE's book *De Artbritide*, &c. being printed off, a copy of it was ordered to be put into the library.

Mr. GOULD was admitted fellow.

May 16, Sir JOHN HOSKYNs president in the chair.

Upon inquiring what alteration had happened to the *terra Nilotica*, which had been ordered to be weighed and exposed to the air? Mr. ASTON answered, that upon the 7th of May there were weighed out, and put into an exact pair of fine scales, three drachms, thirty-seven grains, and  $\frac{1}{10}$  of that earth, being all the parcel given by Dr. PLOT; but that the poise since that time was not sensibly altered.

Upon mentioning the heaviness of the air in fair weather, and its lightness in rain, it was observed, that fair weather was very hazy and unfit for a telescope; but rainy weather clear, by reason of the rains gathering up, and carrying away all the little drops dispersed in the air, whereby it becomes more pure and dry.

Hence

Hence Mr. HENSHAW observed, that watery grounds were used to be floated for the better carrying away and clearing them of water.

Sir JOHN HOSKYNs was of opinion, that floated grounds became thereby levelled, and so apter to lie dry.

Upon reading Dr. SLARE's account of a man's urine, after drinking wine, it was taken notice of, that there was no vinous spirit found, though Dr. WILLIS spoke much about it.

Dr. KING named an experiment, which he had formerly made, to prove the circulation of the blood, but having other uses: He injected into the artery of a dog eighteen ounces of milk, which after half an hour's time, and divers circulations, came out of a vein, then opened, in a less or greater quantity, according to the blood mixed with it, but not altered in colour or other qualities, but swimming upon the blood. After seven or eight hours the dog usually died convulsive.

Mr. ASTON read a letter to himself from Monf. MARIOTTE, dated at Paris 25 April, 1683, N. S<sup>t</sup>. in answer to one about the motion of the pendulum in several climates; as also concerning a book of Monf. PERRAULT, assigning new proportions to the five orders of architecture; and concerning Monf. DU VERNEY's treatise of the organs of hearing; on which occasion Monf. MARIOTTE mentions his own opinion, that the perception of the sensory lies in the inward membrane, encompassing the nerve; which membrane comes from the *pia mater*.

An account was given of two printed letters of Monf. PERRAULT and Monf. MARIOTTE, presented to the Society for their library; the former asserting the organ of vision to be the retina, the latter the choroid.

There was read likewise a translation of a paper, received from Monf. JUSTEL, being a summary of the experiments about magnetism made at Paris by Monf. CHAMARS, with other things relating thereto.

A curious small quadrant of two feet radius, very well fitted up, for the taking distances as well as heights, to be sent to Venice, was brought by the instrument-maker, Mr. WYNNE, to be shewn to the Society.

May 23. Sir JOHN HOSKYNs president in the chair.

A discourse being occasioned concerning the slope, which is necessary in the bed of a river for making the water flow conveniently, one foot descent in 200 having always been accounted too much; Mr. PACKER was asked his opinion about the descent of the new river water between Ware and Islington; which upon all the windings was estimated to be about fifty miles: to which he answered, that he conceived it might be about fifty feet.

<sup>1</sup> Letter-book, vol. viii. p. 336.

A letter of Monf. JUSTEL to Mr. ASTON, dated at London : June 1683, <sup>a</sup> was read, concerning some things lately made in France ; and, among the rest, a sort of candlestick very good for preserving the sight, and increasing of light ; and a new kind of pneumatic engine, said to be made more perfect than that then in use : and that Monf. D'ALANCE, a very curious gentleman at Paris, had made trial of it.

Mr. HALLEY having a new hypothesis concerning the variation of the compass, and the magnetism of the earth, made some experiments for the better explaining it.

He placed two loadstones and a needle triangular wise, so as the needle might be equally distant from either pole. The needle lay indifferent, not pointing to either pole, but between both.

If the needle was removed altogether on one side, then it pointed to the nearest pole, and took no notice of the other. To apply this, he supposed four magnetical points or poles in the earth ; the first of these, and highest to us, lying in or near the meridian of the land's end, within about seven degrees of the north pole. By this the variation of Europe and Tartary are chiefly governed, till the other magnet pole concerns itself, which lies in the meridian of California, about sixteen degrees from the north pole. By this North America is affected ; and the sea on both sides of it from the Azores to Japan. The third pole lies in a meridian, about twenty degrees westward of the straits of Magellan, about sixteen degrees from the south pole. This governs in South America and the ocean on both sides of it. The last pole, and of greatest force, is in the meridian of Nova Hollandia, and the island Celibes, about twenty degrees from the south pole. This rules the Cape of Good Hope to the middle of the South Sea.

Though the simple force of each of these poles, and much more the complicated one of two or more, are able to do much ; yet he proposed as a desideratum, to know the proportion, in which the virtue of a magnet decreases, when you remove from one of its poles ?

Dr. TYSON brought in a lizard, which he had anatomised, together with the figures curiously drawn by Mr. WALLER \*. The things remarkable in it were four penis's, as in a rattle snake ; the lungs a large bladder ; the testes lying high in the body, and the kidneys near the anus.

May 30, at a meeting of the COUNCIL in the repository were present

Sir JOHN HOSKYNs president

Sir ANTHONY DEANE

Mr. CREED

Mr. HENSHAW

Mr. HILL

Dr. KING

Dr. SLARE

Mr. MEREDITH

Mr. ASTON.

June 1684.

= Mr. RICHARD WALLER, F. R. S.

<sup>a</sup> Letter-book, vol. viii. p. 339.

<sup>1</sup> This theory is printed in the Philosophical Transactions, vol. xii. N<sup>o</sup> 148. p. 208. for

It was ordered, that the secretaries take all their minutes at the table in a small book, which shall remain to the Society.

That a committee be appointed every month for looking over the entries to be made in the journal and other books of the Society; and that Mr. HILL, Dr. SLARE, and Mr. PERRY, or any two of them, take care of the first month.

At a meeting of the SOCIETY, on the same day, Sir JOHN HOSKYNs president in the chair:

There were presented from Dr. PLOT the following particulars, 1. *Sulphur Orientale*. 2. Metallic coals, such as take fire of themselves. 3. Clod salt from the brine pits in Staffordshire. 4. Natural vitriol crystallized, from Chemnitz, just as it was taken out of the earth. 5. Green spar.

Dr. AGLIONBY produced an account, taken out of the second volume of *Ramusius*, concerning an herb growing in Tartary, called *Balthracan*, being of such excellent use, that it sustains both horie and man, and is the best part of their food in the deserts. The same herb was afterwards taken notice of to grow in Epirus and near Padua.

A letter of Mr. LISTER to Mr. ASTON, dated at York May 28, 1683\*, was read, containing answers to some queries, which had been formerly sent him concerning ruddle, seeming to be a sort of hæmatites; the spontaneous firing of pyrites, and the powder of the melted stones of *Ætna* applying to the loadstone; and cornua Ammonis, found plentifully at Huntley Nabb, in a sort of stones called cuts-heads.

Dr. SLARE shewed an experiment of two clear liquors, which upon mixing together by day-light flamed during two or three minutes; then cast up shining substances like stars against the sides of the glass, flashed like lightning, and filled the glass with a white smoke.

June 6, at a meeting of the COUNCIL were present

Sir JOHN HOSKYNs president

Sir ANTHONY DEANE

Dr. KING

Mr. HENSHAW

Dr. SLARE

Mr. COLWALL

Mr. MEREDITH

Mr. HILL

Mr. ASTON.

It was resolved, that Mr. HOOKE shall receive every meeting day order for the bringing in two experiments at the next meeting-day, together with a declaration by word of mouth of the purpose and design of the experiments, and an account in writing of the history thereof, and the purpose as aforesaid, such as may be fit to be entered in the register: and that at the end of every quarter there shall

\* Letter-book, vol. viii. p. 340.

be a meeting of the council, where his performances shall be considered, and a gratuity ordered him accordingly; and that from this time he have no other salary.

The secretary was ordered to leave a copy of this order at Mr. Hooke's lodgings.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs president in the chair.

Upon the mentioning the bactracan, the president remarked, that it was described in BAUHINUS's *Pinax*, under the name of *Panax Heracleo similis*; which Mr. CHARLES HOWARD said was growing upon the downs in Surrey and in several other parts of England. et 1.

A piece of cinder of *Ætna* was beaten small, and tried by a magnet (as Mr. LISTER had given advice to do) for the better finding the concern of the pyrites in natural vulcanos. It appeared plainly, that some of the smaller parts stuck to the magnet.

The president observed, that the cinder of *Ætna* was like the cinder *sulphuris vivi*.

Upon naming the *cornua Ammonis*, Dr. GALE said, that about Whitby in Yorkshire there were several of these snake-stones.

Mr. EVELYN remarked, that there were great quantities of smaller ones in the copperas beds.

Sir JOHN HOSKYNs mentioned, that they were generally to be found in the places, where petrifications are made.

Sir ROBERT SOUTHWELL gave a description of a fish, which he had lately seen at Sir NATHANAEL HERNE's Lady's house, called a sea-bat, having a kind of fins placed along the top of the back, like wings, on each side, a little tail, and short legs.

Mr. HALLEY described a sailing fish about St. Helena, called a carvel, being like a worm in a bladder.

There were presented from Dr. PLOT, 1. A piece of rock crystal from Madagascar. 2. Naphtha from Pitchford in Shropshire. 3. Sand from St. Christopher's; which being examined by a magnet, seemed to consist mostly of iron, it being black and sparkling in colour, and almost as sensible of the magnet as filings of steel.

There was also examined by a magnet some sand, such as is used in ink-horns, and

and said to be brought from Ormus, which adhere strongly to the magnet, as the former.

Mr. HAAK shewed a load-stone, which usually takes up a six pound weight. The same stone, when fatiated with filings of iron, would not take up  $\frac{1}{2}$  a pound; nor much more than  $\frac{1}{2}$  a pound, till all the filings were carefully wiped away.

A small pair of brass compasses with iron points being set upright with the feet upwards, the stone held over it in the air, and not touching it, kept the compasses standing for two or three minutes of time.

Mr. WALLER repeated the experiment made at the last meeting by Dr. SLARE. He put a phosphorus into oil of vitriol; then he poured into them oil of turpentine, which flamed up from the ground above half a yard high. Upon the pouring in a larger quantity of oil of turpentine the flame was the stronger.

Mr. AUBREY related from an eminent embalmer, that he found a sort of insects in dead bodies, which he concluded to be bred in the brain; but of this there was no proof offered.

Dr. GALE being to write to Dr. BOHN of Leipzig had a present allotted to be sent to Dr. BOHN of Mr. LISTER's book *de Aquis Medicatis*, and some of the late *Philosophical Transactions*.

Dr. SLARE shewed some figures made upon dissecting the guts and uterus of a goat.

June 13, Sir JOHN HOSKYNs president in the chair.

Upon reading the trials made with a magnet on sand from Ormus and St. Christopher's, Mr. WICKS was desired to procure from the East-India ships a quantity of the shining sand of St. Christopher's and James river in Virginia for the making farther experiments.

Count ZINZENDORF, envoy from the elector of Saxony, having been introduced, there were first shewn the magnetical experiments made the last week by Mr. HAAK.

Then Dr. SLARE tried an experiment of BARTHOLINUS. He poured into a deep glass receiver six ounces of fresh drawn aqua fortis, and into that four ounces of recent spirit of Venice turpentine well rectified. The receiver was lightly stopp'd with a cork, for the keeping down the fumes: then was set in the sun. In less than a quarter of an hour there was said by one person to be seen a flame in the glass; but upon speedy viewing it, this was rather thought to be the sun passing among the steams.

June 20, at a meeting of the COUNCIL were present,  
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Sir

Sir JOHN HOSKYNs president

Mr. COLWALL

Mr. MEREDITH

Mr. HILL

Mr. ASTON.

Dr. SLARE

Mr. HOOKE being called in, and the order made concerning him on the 6th of June being read, he then declared his satisfaction therewith, and his resolution to proceed in his office of curator upon those conditions.

Leave was given to Mr. HOOKE to have access to the journals or council-books upon occasion of his business with Sir JOHN CUTLER\*.

At a meeting of the SOCIETY on the same day, Mr. HENSHAW vice-president in the chair.

In an occasional discourse about the production of gold, Mr. HENSHAW remarked, that though it was often found in the beds of rivers, yet it seemed rather to be bred in a stone like a white marble, of which Dr. BROWNE brought a piece from Chreminitz, which was now viewed, and appeared to be such.

Some sand from the Danube given formerly by Mr. BEMBE, and containing gold, being tried with a magnet, adhered to it very strongly.

A discourse having formerly been read of a bitch bearing her puppies *extra uterum*, Dr. TYSON shewed a draught, that had been taken of the uterus of a bitch, together with four or five places *extra uterum*, where several puppies had been contained in skins of their own.

There was also shewn one of the puppies bred *extra uterum*, together with several pieces of bones and some skulls, the insides of which were all filled with hairs growing out of the sides.

Dr. TYSON likewise shewed a part of the great artery of a woman, having several distinct flat bones growing to the inside:

As also the bone of a chicken, which after having been broken had cemented itself together very strongly.

Dr. SLARE shewed how fresh spirit of nitre highly rectified, poured upon fresh spirit of wine highly rectified, would not ferment, or cause any ebullition: but if the spirit of wine were poured upon the spirit of nitre, the effervescence became very great and scarce to be equalled.

There was also repeated the experiment of BARTHOLINUS, tried at the last meeting, with aqua fortis and spirit of turpentine. About a quarter of an hour after these two bodies were mixt, there was an extraordinary strong and sudden

\* Who had refused paying Mr. HOOKE his salary for reading the Cutlerian lectures.

effervescence

effervescence, which not only flung off the cork of the glass receiver, but broke out a piece of the side. But no flame was observed by any person.

It was hinted, that the conflict of bodies ought not to be attributed to alkali's and acids, there being little or no alkali to be found in the two preceding experiments, though the heat and ebullition in the liquors was extraordinary.

June 27. Sir JOHN HOSKYNs president in the chair.

In speaking of bodies, wherein gold is found, Mr. Hooke said, that lapis lazuli was copper or the pyrites.

Mr. EVELYN counted glauber for gold, being universally to be found in other bodies.

He remarked likewise, that it was found in a brook falling into the lake of Geneva.

Mr. Hooke said, that there had been some taken up in the west parts of England.

Upon speaking of the washing gold sand, it was related, that one Mr. PLEDWELL of the Temple recovered 1500*l.* in gold, when his chamber was burnt, upon washing the rubbish.

There being mentioned some Bohemian mushrooms containing gold, as was certified in a letter from Nuremberg, Mr. EVELYN said, that he had a very perfect mushroom petrified, which he took to be a field mushroom. Mr. Hooke was of opinion, that the greatest part of the petrified mushrooms grew in the water.

Upon reading the experiments of the last meetings about effervescence, Dr. GREW remarked, that two or three drops of spirit of wine poured into aqua fortis made no alteration; but that if eight or nine drops were put in, they stirred it sufficiently.

There were presented from Dr. PLOT for the repository, 1. *Selenites dodecaedros*, mentioned in his *Natural History of Oxfordshire*. 2. A piece of a cup made of the true Lemnian earth, having a peculiar smell, which was supposed by Dr. GREW to be oil of sulphur. 3. *Selenites seu lapis specularis* from Shotover.

The first experiment brought in by Mr. Hooke was the shewing how a piece of unmelted lead would swim in melted lead<sup>b</sup>.

Upon this it was discoursed by some, that the air keeping to the unmelted lead hindered the melted lead from taking it in.

<sup>b</sup> Register, vol. vi. p. 65. It is printed in his *Philos. Experiments and Observations*, p. 89.

It was also said, that the surfaces of bodies often bear up a weight, which will sink, when it is emerfed.

Upon discoursing of the drofs of metals, Mr. HOOKE took notice, that iron upon heating turns it in a scale; and so as often as it is taken off; but that the same scales are easily reducible to iron.

Upon mentioning the rising of ice in rivers upon a thaw, it was conceived, that rivers do not freeze at the bottom; but if ice were accidentally carried down to the bottom of a river, the same in a thaw growing like a honey-comb would certainly rise up again.

The second experiment of Mr. HOOKE was to shew how high water will rise in any place\*:

The experiments appointed for Mr. HOOKE at the next meeting.

1. A scale to measure the force of mounting waters.
2. An experiment to examine the specific gravity of melted metals.

July 4, Sir JOHN HOSKYNs president in the chair.

Dr. WETHERALL, Lord Bishop of Cork, was elected unanimously.

There being a discourse about petrified mushrooms, Mr. RICAUT said, that he had seen great quantities of them taken out of the Red-sea.

He remarked likewise, that he had seen coral fished up at the isle Fagignana, near Sicily, which at the first taking out of the water was something pliable, but became hard afterwards by lying in the sun.

To this was objected the authority of Boecone and some others.

It was answered, that there might be a difference in coralline bodies; and that some plants might be more hardened with a coralline juice than others.

Mr. HENSHAW mentioned a coralline, which he had seen on the coast of England, the under branches of which were hard, and the upper parts soft, though all lying under water.

Dr. SLARE shewed the thigh-bone of a man having an exostosis in the middle four inches long, and an inch and  $\frac{1}{2}$  broad.

A letter from Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, July 1, 1683<sup>d</sup> was read, giving an account of the alteration in weight happening

\* Register, vol. vi. p. 66. It is printed in his *Philos. Experiments*, &c. p. 90.

<sup>d</sup> Letter-book, vol. ix. p. 14.

in the terra Nilotica between the 1st of May and the 17th of June; the gain of eleven drachms and ten grains being in all that time but two grains, the greatest increase of weight being in wet weather.

The same letter gives likewise an account of an experiment of the injection of  $4\frac{3}{4}$  of warm water into the thorax of a dog, which caused a rigor in his hinder parts, and difficulty of breathing; but the symptoms were past in two days time.

Mr. LISTER sent a draught of a piece of the wall in York, being a remainder of a Roman building, together with a discourse about it<sup>a</sup>; which being read, was very well approved of. In the length of the *dideron* he inclined to PLINY, who calls it a foot and a half, and not to VITRUVIUS, who makes it but a foot. But the passage of VITRUVIUS being turned to in a manuscript of the Norfolkian library, the length of the *dideron* was read a foot and an half.

Mr. HOOKE shewed the rule for calculating the pressure of water in a pipe<sup>f</sup>.

He shewed likewise a way to find the true and comparative expansion of any metal, when melted<sup>g</sup>.

The experiments appointed for the next meeting were,

1. Comparing of buckets, forcers, and pumps:
2. The model of a new kind of wind-mill of Mr. HOOKE's invention.

July 11, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs president

Mr. HILL  
Dr. GREW

Dr. SLARE  
Mr. ASTON.

The journal books being not yet corrected and perfected, according to an order of March 28, the president was pleased to undertake the trouble of doing it; and the journal books were left at the repository for his use.

Dr. ALLEN MOULIN of Ireland being proposed as, a candidate by Dr. SLARE in the name of Mr. BOYLE, was approved of by the council.

It being thought proper, that some man should be appointed to keep the door of the meeting-room during the time, that the Society was assembled, the porter, who removed the seats, was ordered to wait, and to have 12 d. a time, when he waited.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs the president in the chair.

<sup>a</sup> It is printed in the *Philos. Transactions*, vol. xii. N°. 149. p. 238. for July 1683.

<sup>f</sup> Register, vol. vi. p. 68. It is printed in

his *Philos. Experiments*, p. 91.

<sup>g</sup> Register, vol. vi. p. 71.

his *Philos. Experiments*, p. 94.

It is printed in

Upon

Upon reading the minutes concerning Mr. LISTER's observations on a Roman wall found out by himself at York, a paper of Mr. WALLER concerning the wall at Verulam was read. This wall was made of brick and flints. The bricks lay in three rows, as at York in five. The space between the ranges of bricks was 2 feet 7 inches, which is near the measure laid down by PALLADIO. The length of the bricks was  $16\frac{1}{2}$  inches; the breadth 12 inches and near  $\frac{1}{10}$ , sometimes a quarter of an inch narrower; the thickness  $1\frac{1}{8}$  inch, but in some  $1\frac{1}{8}$  more, in other  $\frac{1}{8}$  or  $\frac{1}{16}$  less.

Mr. PAYNE took notice, that he had measured a Roman brick in London wall, which was about 17 inches long and an inch and half thick.

It was desired, that if a whole brick could be procured, it should be sent to the Society.

Dr. TYSON brought in two pieces of a Roman pavement lately taken up near Crosby square<sup>a</sup>, where it was 9 feet under ground, that, which was above, being all made earth.

Dr. SLARE explained some hysterical symptoms by a solution of sal armoniac in water, which gave a considerable degree of cold without any ebullition of the liquors.

He also explained the cold paroxysm of an ague by a mixture made with volatile salt of human blood, and a spirit of vinegar or aceturum radicum, which produced a remarkable degree of cold with a very high ebullition<sup>b</sup>.

While the liquor was in this condition, there was poured into it a spirit of sulphur *per campanam*, which immediately altered the temper of the liquor to a manifest warmth, and raised the weather-glass above an inch and half.

Mr. HERBERT proposed, that the Jesuits powder might be put into the cold liquor, to see whether it would hinder the effervescence.

Dr. ALLEN MOULIN of Ireland was proposed as a candidate, having passed the council.

Mr. HOOKE shewed the model of a new sort of wind-mill<sup>c</sup>.

He shewed likewise a way to stop any great weight from falling down to the bottom, when the rope or chain, by which it is drawn, chances to break<sup>d</sup>.

The experiments appointed to be made by him at the next meeting were about chariots.

<sup>a</sup> In Bishopgate street.

<sup>b</sup> See *Philos. Transact.* N<sup>o</sup>. 150. p. 295. &c.

<sup>c</sup> An account of it is entered in the register, vol. vi. p. 73. and printed in Mr. Hooke's

*Philos. Experiments, &c.* p. 107.

<sup>d</sup> Register, vol. vi. p. 75. It is printed in his

*Philos. Experiments,* p. 109.

1683-J

# ROYAL SOCIETY OF LONDON.

At a meeting of the COUNCIL were present,

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Mr. HILL  
Mr. HENSHAW  
Mr. COLWALL

Sir JOHN HOSKYNs president  
Dr. SLARE  
Mr. ASTON.

It was ordered, that Mr. HUNT provide six keys for the presses, which he may lend to any of the council: but if any, who are not of the council, desire a book to read in the library, Mr. HUNT shall set down their names and the title of the book in a quire of paper, and when he receives the book again, shall strike out the name: and

That Mr. HUNT bring down all the instruments, which lie in the upper rooms, and lay them in the library to be viewed and disposed of as shall be most proper.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs president in the chair.

Upon mentioning the printing Mr. LISTER's observations about the Roman wall at York, it was suggested, that a note should be added signifying, that a manuscript of VITRUVIUS in the Norfolkian library agreed with Mr. LISTER's opinion about the measure of the *didoron*.

Dr. SLARE gave an account of his examination of the oil of vitriol, which had increased its quantity by lying exposed to the open air. The liquor, which was first drawn off, was an insipid water near the quantity of that gained out of the air: then there was an oil of vitriol about the quantity, which was first exposed.

Dr. CHARLES WILLOUGHBY was proposed as a candidate by the Bishop of Cork.

Dr. ALLEN MOULIN was elected a member.

A long letter of Mr. LEEWENHOECK<sup>o</sup>, dated July 16, 1683, was read, containing several curious observations about the manner of generation, supposed by him to be out of the animalcules found in *semine masculino*, which is received in the point of the egg, which he calls *het placie of stipie van het cloir 'vat het eij*; in which place alone it receives its nourishment and growth.

This letter contained likewise several observables in the parts of a frog; the description of the animals found in the seed and the excrement; a notion of digestion in the stomach and guts by breaking the meat in pieces through the motion of these parts; and an opinion concerning the motion of the blood in a fever.

• It is printed in the *Philos. Transact.* N<sup>o</sup>. 152. P. 367. for October, 1683. Notice

Notice was given the Society, that after the next meeting there would be an adjournment during the long vacation.

Mr. Hooke shewed two experiments for the converting an horizontal circular motion into a perpendicular, or any otherwife sloped circular motion, or *vice versa*, &c. of which he gave in the following account<sup>a</sup>.

" Then I shewed the two following experiments or inventions, which were both to do the same thing, but by different ways, and with different advantages; namely, *how to convert a horizontal circular motion into a perpendicular, or any otherwife sloped circular motion, and vice versa*, keeping in all parts of the revolution the same velocities with the velocities of the corresponding parts of the revolution of the circulating body, that communicated the motion. And this without wheel pinions or trundles, and without any considerable friction or impediment to the motion of either; which are of great use in mechanic inventions and engines, though possibly not so well understood by the greatest part of mechanicians, much less by those, that make use of them, and least of all by others, not concerned in either.

" The first was performed by the means of a double cross, after the same manner contrived with the single cross described and explained in an invention I formerly shewed to this Society, of an engine to make all manner of dials, both mechanically and geometrically true to the minutest divisions, without the help of calculations or troublesome \* \* \* \* of practical geometry.

" The only thing to be taken heed of in this invention was, that the arms of the intermediate piece between the horizontal and perpendicular axis should be in the same plain, and that the axis of it should lie equally inclined to both the other axes.

" This way performed the effect with the greatest steadiness, freeness, and easiness of motion, without friction or wearing, and so for most uses is best, though it be somewhat more troublesome and chargeable in the making; but for divers other uses the second way was more easy, which was done only by a ring joining the two ends of the cylinders (namely, of the horizontal and of the perpendicular) together, each of which ends had a hole or loop through it fit to receive the said ring, as by the model and experiment made therewith plainly appeared.

" This second or latter way, though it were more simple and easy to make, was not in the use thereof, where strength was very considerable, or equality of motion was necessary, so good as the former; though for many ordinary uses it might serve well enough, and so be of more general and common use than the other, and so is valuable upon the account of its plainness and practicableness. For in mechanics (contrary to the opinion and practice of most projecting mechanicians and ignorant spectators) an invention is valuable not for the

<sup>a</sup> Register, vol. vi. p. 79.

"clutter, pomp, complication, and difficulty; but for the simplicity, plainness, obviousness, and easiness, both of understanding, making, using, and repairing, which makes it approach the nearer to the example of nature, which doth nothing in vain, or by longer and more difficult ways, which may be done by a shorter."

"Nor were these inventions only useful for communicating a motion of rotation true at right angles, but of doing the same thing at any other inclination of the axes, which in many cases is very useful; as also for conveying a vibrating or reciprocating motion, and farther likewise for conveying a reversed, circular, or reciprocated motion to a parallel cylinder, some good uses whereof I may hereafter make appear."

July 25. Sir JOHN HOSKINS president in the chair.

Dr. MOULIN was admitted fellow.

Dr. WILLOUGHBY was elected and admitted.

Mr. ABRAHAM HILL, in his own name and that of Dr. TILLOTSON, dean of Canterbury, presented to the Society for their library a manuscript of Dr. ISAAC BARROW, containing his demonstrations of ARCHIMEDES and APOLLONIUS.

It was observed upon Mr. LEEWENHOECK's letter of July 16th, that the point, where the animal of the male seed is to be first received, and where it is to be first nourished, is placed in the yolk of the egg; and accordingly, that Mr. LEEWENHOECK made search for the animal in the yolk of the egg; whereas he ought to have looked for it in the white; which is certainly the first nourishment of the chicken, the colliquamentum being there to be found after twelve hours incubation.

It remained to know, whether Mr. LEEWENHOECK by the abovementioned point did not mean the cicatrix, which adheres to the yolk of the egg.

Mr. LEEWENHOECK having hitherto been unsuccessful in tracing the animal, it was desired, that he would examine a greater variety of eggs, and particularly those of a silk-worm.

Dr. SLARE having in the meeting of July 11, produced a cold liquor, causing an ebullition, such as may be supposed in agues, and it being desired to know what effects the Jesuits powder would have, being mixed with it, brought the following experiment.

He made a strong infusion of the cortex Peruvianus in a highly dephlegmated spirit of vinegar, which being examined by a quantity of volatile salt of human blood cast into it, whether any fermentation would ensue; it was found, that it did

<sup>1</sup> See *Philos. Transact.* N°. 150. - p. 301.

and that very considerably. But having afterwards infused a quantity of opium in the said tincture, it was found, that the volatile salt made much less ebullition.

He joined chalk with the cortex Peruvianus, which so far altered the liquor, that the usual ebullition did not succeed.

The Society adjourned, as usual, during the long vacation.

Octob. 24. The Society met again at Gresham-college after their recess, having been summoned in the usual manner, Sir JOHN HOSKYNs president being in the chair.

MONS. LUDOLFUS, the author of the history of Æthiopia, with two other gentlemen his companions, were permitted to be present at this meeting.

MR. ASTON gave an account, that he had received a present to the Society from Signor MALPIGHI, being the following books, 1. *Ricreazione dell' Occhio et della Mente nelle Osservazione delle Cbioccielle del Padre PHIL. BUONAMY*: printed at Rome in 4to.

2. *Relazione del ritrovamento del novo delle Cbioccielle*: printed at Bologna in 12mo.

3. *Erasistratus, sive de Sanguinis missione: auctore LUCA ANTONIO PORTIO*: in 12mo.

4. *Del Ghiaccio del Padre DAN. BARTHOLO*: 1683, in 4to.

5. *De urinis & pulsibus, de missione sanguinis et febris, de Morbis Capitis & Pelioris, a LAURENTIO BELLINI*: Bologna 4to, 1683.

6. *De Cometarum Naturâ & Ortu a DOMINICO GUGLIELMINI*: Bologna 1681 fol.

There came no letter with this present; but MR. ASTON writing to Signor MALPIGHI<sup>a</sup> sent him, in the Society's name, Dr. GREW's *Anatomy of plants*, MR. LISTER's book *De fontibus medicatis Angliæ*, some of the *Philosophical Transactions*, *Prelæiones postumæ* ISAACI BARROW, and Dr. WILHEM TEN RHYNE *De Aritritide*.

A letter of MR. HEVELIUS to MR. ASTON, dated at Dantzick July 17, 1683<sup>b</sup> was read, together with his observations about the conjunction of SATURN and JUPITER, and some occultations of the fixt stars<sup>c</sup>.

An answer being returned by MR. ASTON<sup>d</sup>, there were sent him as a present from the Society, Dr. GREW's *Anatomy of plants*, MR. LISTER *De fontibus medicatis Angliæ*, ISAACI BARROW *Prelæiones postumæ*; Dr. TEN RHYNE *De Aritritide*, some of Mr. HOOKE's *Philosophical Collections*, and some of the *Philosophical Transactions* for this year.

<sup>a</sup> Mr. Aston's letter was dated 23 May, 1683, and is inserted in the letter-book, vol. ix. p. 24.

<sup>b</sup> Letter-book vol. ix. p. 12.

<sup>c</sup> Ibid. p. 1 and 9. These observations are

printed in the *Philos. Transact.* N°. 151. p. 339 for Sept. 1683.

<sup>d</sup> Dated August 23, 1683. and inserted in the letter-book, vol. ix. p. 25.

A letter

1683-1

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A letter of Mr. LEEWENHOECK, dated September 17, 1683, was read, containing a description of three sorts of animals found in the scurf of the teeth, when it is mixed or dissolved in spittle or rain-water. These animals die in the water upon putting in a drop or two of wine-vinegar.

This letter contained also an account of the substance in the nose and face called worms, which are nothing else but pieces of hair, sometimes to the number of twenty or thirty, mixed with a clammy body.

It contained likewise a discovery of the structure of the cuticula in a man to be all scaly like a fish, and the scales shewn to be five-sided, to lie three deep one upon another, to expose but one third part of a scale to view, to shed at some times from the body, to be so small, that a sand will cover 200 of them. It was also affirmed, that there are no visible pores for the ejection of sweat.

It was desired, that Dr. SLARE would endeavour to borrow one of Mr. MELLIN's glasses, whereby these observations of Mr. LEEWENHOECK might be examined at the next meeting.

Some being apt to doubt, whether bodies so small as Mr. LEEWENHOECK mentioned, are really to be seen, Dr. KING affirmed, that he had seen things after 3000 times magnifying, which were then no bigger than the point of a fine needle.

Dr. GREW objected against there being no pores in the body, and said, that he had seen pores in the hand ranged in spherical triangles, and some in elliptics.

The discourse falling from microscopical worms to other large worms in the teeth, Sir ROBERT REDDING mentioned a worm found in a hollow tooth; and Sir THEODORE DE VAUX mentioned a paper of Sir THEODORE MAVERNE's, which the Society had seen, concerning a woman, who killed worms in the teeth.

Dr. KING mentioned a worm, which he had found in the liver of a mouse.

Mr. ASTON was desired to inquire in his answer to Mr. LEEWENHOECK, whether the latter had observed any worms in the putrefaction of boils or the small pox.

A letter of Mons. JUSTEL to Mr. ASTON, containing some description of Sir SAMUEL MORLAND's engine for carrying water to Versailles; that it consisted of fourteen wheels, twenty pipes to carry water up to the top of the tower, and fourteen descending to carry it to Versailles, which had each eight inches diameter.

With this letter came a book presented to the Society by the author, Mons.

It is printed in the Philos. Transact. No. 159.  
vol. ix. p. 568. for May 1684.

Letter-book, vol. ix. p. 27.

HAUTE

HAUTEFEUILLE, about the improvement of perspective glasses, and the best ways of finding the focus of long objectives; concerning which book the Society's opinion was desired by the author.

Mr. HOOKE having just cast his eye upon it did not seem to find any thing new, which might be of very great concern; but the book being longer than he could read at present, it was referred to be perused by some of the members.

Dr. HOLDER mentioned, that an earthquake having lately happened in several parts of England, it would be proper, that the Society should procure such accounts thereof, as they might rely upon hereafter in the forming of a theory.

Mr. AUBREY shewed a part of a letter from Rutland concerning the earthquake in that county; but it was not circumstantial, either in the day, time of the day, or duration.

Dr. GALE promised to bring a letter, which he had received from Derby, concerning the earthquake.

It was desired, that such members, as could procure accounts, would communicate them; and that Dr. PLOT be written to about it.

From several members of the Society and others, meeting at Oxford for making experiments, was communicated an observation of the weight of the earth of the Nile about the time of the overflowing of that river, but especially a relighting of a piece of nitroon or nitre, brought from Ægypt, which continually wet the papers, on which it lay, both in rains and dry weather, from the middle of June till about the end of September.

There was also an intimation of fish having lived in a cistern upon rain-water only for half a year, till upon the freezing of the water they died by breaking of the ice.

There was also mention made of a probable way of tinging white marble black, but it was not discovered.

An experiment was proposed of tying the Fallopiian tubes of a bitch presently after her being lined.

Mr. MELLIN, the maker of the curious microscopes, presented to the Society BARTHOLOMÆUS *de proprietatibus*.

GUARINI's book, *De le misure delle incommensurabile*, was presented by Dr. AGLIONBY.

Mr. HOOKE was desired to bring in such experiments as he should have ready at the next meeting.

Obb.

Mr. LEEWENHOECK's last observations having not yet been tried, Dr. AGLIONBY, Dr. TYSON, and Dr. SLARE were desired to undertake the trial, and report the success.

The president queried upon the assertion, that there are no pores, how that would agree with MALPIGHI's discovery of glandules in the skin, whereby the sweat is separated.

Dr. GREW produced a draught of the apparent situation of the pores in the middle of the hand; whereupon he observed the magnitude of the pores and their position.

As to the magnitude, he said, that the pores were biggest, where the hand was hardest and most callous.

In the position of the pores, he said, that they were ranged to answer three sorts of motion in the hand, one towards the right, another to the left, and the third motion in grasping.

He confirmed the truth of Mr. LEEWENHOECK's observations in his schemes of several sorts of wood\*, which he had observed with a glass of his own, though Dr. GREW differed from him sometimes in his deductions or the philosophical part.

Upon mentioning worms being found in the air during a plague-time by father KIRCHER, Dr. AGLIONBY said, that the late murrain in Germany preceded by a blue mist, which might be some sort of insects.

It was questioned whether the engine described in Monsr. JUSTEL's letter were Sir SAMUEL MORLAND's: however it was wished, that a draught of it might be procured.

Mention being again made of Monsr. HAUTEFVILLE's book, Mr. HOOKE said, that he had formerly contrived glasses of parallel pieces, but found them unserviceable.

Dr. GALE shewed a letter from Mr. WILLIS at Derby concerning the last earthquake. It happened on the 6th of October two minutes before eleven at night. It was then calm, but in the day the wind had been strong from the south-west. From the same corner for two minutes was heard a roaring noise like thunder, before the shaking was felt. The earthquake was said to be more violent towards the north-east.

\* Those observations are printed in the Philos. Transact. N<sup>o</sup>. 14<sup>th</sup>. P. 197. for June 1683.

Dr. GALE said, that he had been informed, that the ground had cleft in some places.

Mr. HILL remarked, that the earthquake had been said to shake a bed-head with a man in bed above six inches out of the place.

Dr. AGLIONBY having read over the Italian book intitled *Relazione di ritrovamento dell' uovo delle Cbiocciole*, delivered in a good account of it in writing, which was read.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, Oct. 27, 1683<sup>7</sup> was read, mentioning, that the company meeting the night before in the natural history schools there, Dr. PIOR made a discourse concerning earths; which, when perfected, would make a table of all kinds of earths, such as the Society had desired of him at his being in London.

In this letter it was asserted, that hard tempered iron upon striking yields a larger spark, and deeper in colour, than steel will; and that a magnet carried in a pocket attracted unequally at different times.

It was mentioned in this letter, that in the assembly it had been ordered to try the way of softening and hardening iron; the alteration in the poles of a needle after cutting it in two; and whether bricks heated and afterwards grown cold, lying north and south, will acquire a verticity.

It was desired by some present, that if any of the Society had taken the trouble of defining and distinguishing the several sorts of earth in England, they would produce their draught together with Dr. PIOR's.

Mr. LISTER promised to bring in a table of sands and clays, such as he had found in the north of England; as also some samples of the things themselves.

He shewed the way, which he had made use of, for the keeping his account of the barometer, which was approved of as very easy and convenient. He shewed likewise the book containing three or four years account. Every table containing a month's account was printed off upon a copper-plate. The upper line contained the inches from twenty eight to thirty one inclusive, each inch divided by lines into ten parts. The lines by the sides shewed the days of the month to thirty one. The account was kept by drawing a red line at the height of the quick-silver such a time of the day. The account for the whole month was but one red line bending as the quick-silver rises or falls.

Mr. LISTER remarked, that by seeing the red line, he could generally tell what weather had been at any time, without reading the particular written by the side: That he had often predicted weather four days before it happened: That upon a great storm, such as he had observed three at several times, he found the

<sup>7</sup> Letter-book, vol. ix. p. 35.

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the quicksilver flutter and break like yeast in a vat, sticking in little atoms the side of the glass: Which observation seemed new to all who were

Mr. HOOKE brought in an experiment, in order to measure the strength of the wind<sup>1</sup>.

Mr. CRISPE presented to the Society some pieces of a white substance, incrustated by the dropping of water through the vault of *Roma subterranea*.

November 7, Sir JOHN HOSKINS president in the chair.

Mr. AUBREY related, that the widow of Mr. THOMAS MERRY had several mathematical papers of her husband's, which might be viewed by some of the Society, upon whose approbation the widow might be encouraged to print them. He intimated in a new method of demonstrating EUCLID different from all yet printed.

There were presented from Dr. PLOT, N<sup>o</sup> 48. a sample of iron-ore from Walsall in Staffordshire, working alone, in which the white liquor called *Gur*, is often found by the miner. 49. A piece of *lapis alabastrus* from Cyprus, found sometimes in the Isle of Anglesey. 50. A piece of stone from Molecup, such as they make mill-stones of in Staffordshire. 51. A piece of natural copper, found like a dye.

Mr. LISTER remarked, that the veins of copper at Kewick in Cumberland lay above two yards thick.

The skin of a rangifer was presented by Mr. RICHARD WALLER.

Part of a letter from Mr. TANCRED ROBINSON to Mr. LISTER, dated at Montpellier, August 4, 1683, concerning the fabric of the bridge Pont de St. Esprit on the Rhine, &c. was read.

Mr. ASTON brought in a proposal of Mr. JOHN DAVIS of Nottinghamshire, of several things performable by himself; as to make a machine to weave loop lace; an engine for the making of twist; a way to card wool with a wheel; a way to make a jack go longer than ordinary without winding up or pullies; a pattern of a machine for weaving, as in a silk stocking frame; some ways supported by him new, of raising water, &c.

Mr. HOOKE conceived, that most of the things, which he proposed, were already practised in London.

<sup>1</sup> There is no account of this experiment entered in the Register-book.  
<sup>2</sup> Letter-book. Vol. II. p. 31. It is printed in

the Philosophical Transactions, Vol. XIV. N<sup>o</sup> 150. p. 584. for June 1684.

A letter from Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, Novemb. 3. 1683<sup>1</sup>, was read, giving an account of the cutting in two a magnetic needle; of a loadstone capt taking up most filings upon the edge of the iron; and of an opinion suggested by Dr. ALDRICH, that the ear must have two tympanums for the judging of harmony: since if harmony proceeds barely from vibrations concurring, three fourths would be the sweetest notes.

Mr. HOOKE shewed the impression of a medal taken off upon fish-glue or iun-glafs; which he said was done by dissolving the glue in spirit of wine, and laying it upon the medal till it be dry<sup>2</sup>.

Dr. LISTER gave an account of a way, that had been used in England of taking off the impression of a medal, and contracting it at the same time by repeated laying on of mouth-glue, and filling it with brimstone.

November 14, Sir JOHN HOSKYNs president in the chair.

The president having, according to the statute, nominated five members, not of the council, to audit the treasurer's accounts, they were balloted for, and elected, being Dr. AGLIONBY, Dr. TYSON, Mr. RICHARD WALLER, Mr. HOOKE and Mr. LODWICK.

Mr. HOOKE was desired to go with Mr. AUBREY to Mrs. MERRY, to examine the mathematical papers of her husband.

Monf. JUSTEL presented to the Society the new book of Monf. DU VERNEY *De Poaille*.

Dr. PLOT sent the following specimens:

52. Lead ore from Craven, mixt with a spongy stone bluish. This, he said, was found upon examination to contain a piece of silver no bigger than a small pin's head in an ounce of the ore.

53. A sea-cockle from Scanderoon, which is to be dissolved and used in colouring.

54. Copper ore from Edon Hill in Staffordshire.

55. Mactely copper-ore in Staffordshire.

Dr. AGLIONBY shewed a heavy stone found among coals, which was judged to be pyrites.

The *Gur*, mentioned by Dr. PLOT, was such, as Mr. LISTER formerly sent a bottle of to the Society, and which is not mentioned in Dr. GREW's *Museum*.

<sup>1</sup> Letter-book, vol. iv. p. 37.

<sup>2</sup> His account of this method is entered in the Register, Vol. vi. p. 81, 82, and printed in his

Philosophical Experiments and Observations, p. 111, 112.

Mr. LISTER mentioned two sorts of *Cor*: this, which is of iron, and medicinal, upon burning it in a crucible, turns to a rusty colour, and applies to a loadstone, as good iron uses to do. Another sort is found in a lead-mine, and is of a different nature.

A remark was made of the earthquake on the 6th of October from Mr. FLAMSTEAD of Derby, that at Porto Yale, four miles above Wirtsworth, north by west, some miners being in a shaft seventy-two yards under ground, heard a noise like that of a great foughing wind, and presently felt the rock and engines, and all things else about them, shake.

A letter from Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, November 10, 1693, was read, containing an account of Dr. PIOT's having tinged white marble a quarter of an inch deep: That a loadstone was cut *scandium meidianum*, the north of one half drawing the north of the other: That Mr. PIOT's experiment had been tried with success, the upper end of the bar (which he shewn a branch of an English cork-tree with some of the leaves and acorns, growing at Abington in Cambridgehire, and had given an account of the several methods used by the smiths at Wolverhampton in Staffordshire, for the hardening of their iron: That Dr. SMITH had undertaken to procure a new chart, by which it appeared, that Muscovy and China are not so far distant from each other, as the maps commonly made them: which chart was made by a person, whom Dr. SMITH knew at Constantinople, and who had not long since travelled from Muscovy to China.

Upon occasion of mentioning the cork-tree, it was said, that there was one at Mr. EVERLYN's, at Mr. BALLE's, and perhaps other places.

A paper of Dr. GREW was read concerning the pores, chiefly by the hands and feet, in pursuance of what he had said at the last meeting. He first took notice of the vileness of the pores, which was shewn in a new scheme of part of the hand very much magnified; their situation upon the ridges, not within the parallel furrows; their convenience as to the motion of the adjoining parts; of their extraordinary largeness in some places; and their necessary use for the health of the body.

Mr. HOOKE shewed an instrument to measure the velocity of the air or wind, as follows:

- " I shewed an instrument to measure the velocity of the air or wind, and shewed to
- " find the strength thereof, which was by four vanes put upon an axis, and made very
- " light and easy for motion; and the vanes so contrived, as that, they could be
- " set to what slope should be desired.

This account is inserted in the Letter-book, Vol. II. p. 40.  
" Letter-book, Vol. II. p. 39.

It is printed in the Philosophical Transactions, Vol. X. p. 56. for May 1684.  
Register, vol. II. p. 11.

G E

"It was several times tried and examined in the long gallery of Gresham-college, whereby it appeared, that by walking from one end thereof to the other, and carrying the same above one's head, the doors and windows of the said gallery being shut, and so the air within it being not in motion but stagnant, the instrument made so many turns, as there were circumferential lengths of the said vanes in the length of the gallery: and if by trial it were found to be more or less than the due measure of those circumferential lengths, then by setting the said vanes either flatter or sharper, in respect of the way of its motion through and against the air, the same was easy to be adjusted.

"The use of which may be of very great consequence in the business of sailing, and steering a ship upon the sea, and for examining the power and strength of the wind upon land in order to the theory of shipping, for which it was designed."

Mr. Hooke shewed a convenient way of copying any thing, &c. by making a thin plate of fish glue dissolved in spirit of wine, and well clarified; then poured upon a glass plate as thin as paper, lying there till it be dry; at which time the lines of the object may be drawn upon it as they appear under'.

November 21, at a meeting of the COUNCIL in Mr. Hooke's lodgings were present

Dr. HOLDER  
Mr. HENSHAW  
Mr. HILL

Sir JOHN HOSKYNs president  
Mr. PERRY  
Mr. MEREDITH.

The minutes of this council were taken by the president in the absence of both the secretaries\*.

The auditors of the treasurer's accounts appointed on the part of the council were the President, Mr. ASTON, Mr. COLWALL, Mr. PERRY, and Mr. MEREDITH.

The gratuity due to Dr. SLARE and Dr. TYSON could not be ascertained for want of the books, wherein were contained the orders relating to that matter.

It was resolved, that Dr. GREW, Dr. GALE, Mr. ASTON, Dr. PLOT, and Dr. ACTIONBY be excused from payments due from them to the Society last Michaelmas.

At a meeting of the Society on the same day, Mr. ASTON being indisposed, no minutes were taken; but Mr. Hooke brought in a paper of curiosities brought by Captain ROBERT KNOX from Tunquin, upon the main of China, and presented by him to the Society for their repository, viz.

\* Register, Vol. vi. p. 82. and Dr. Hooke's Philosophical Experiments, p. 112.

† Mr. ASTON was indisposed, and Dr. PLOT at Oxford.

1. A Tunquin plow and yoke, both varnished with the true lacker varnish, which grows in Tunquin, and is thence transported to Japan for making those curious cabinets, screens, boxes, &c. which are thence brought into Europe. This plow is so light and easy to be made and used, that the Captain judged it might be of very good use here in England. The share is cast of iron very curiously wrought therein upon the water; the first representing the mandarins barge and progress, and the second their progress at land with their guard and retinue.

2. Two Tunquin pictures, the first representing the mandarins barge and progress, and the second their progress at land with their guard and retinue.

3. A true dolphin's skin, caught by the Captain in his homeward bound voyage, and stuffed, being very different from the porpoise, which is commonly here called and esteemed to be the dolphin.

4. A paper of the lime commonly used in the Indies to spread upon the Betele leaf. It was extremely fine and white, and had nothing of the sulphureous burning taste, which our English lime generally retains.

5. The Betele nut, being somewhat like a nutmeg for substance. If cut, it appeared veined, and solid like a nutmeg, and had a thin shell, that inclosed it, and without that a stringy pod somewhat like mace; but more like the outward argument of the cocoa nut.

6. A paper of the dry leaves of Betele, which are gathered from a climbing plant growing up against the bodies of other trees like our ivy, but yet of a very different species.

These three last are the ingredients, that compose that masticatory, which is so generally used in all India. Their manner of preparing it is thus: They slice the nut into very thin slices, as we commonly do nutmegs here; then taking a green Betele leaf, which they gather fresh every morning, they spread upon it so much of the aforesaid lime tempered with water, to the consistence of batter for fritters, as almost to cover one side of it; then laying a little of the said sliced nut upon the lime, they fold up the leaf, and so put it into their mouth to chew.

7. The root of the tea-tree, which the Captain designing to bring home growing had planted, and kept growing in a pot of earth aboard the ship, but which by the way was gnawed and so killed by the rats.

8. The tea-seed, being a kind of corn as big as a hazel-nut, which it is hoped might grow in England, it growing in that part of China, where there is both frost and snow.

9. A stick of the wood, with which they make their gun-powder in Tunquin.

10. A small pipe of Tunquin marble, broken off from the steps of one of their temples.

11. A branch of the tea-tree, the tree and leaf being as big as an ordinary bay-tree.

12. The leaves or blades of the Indian gallingale, not regarded in Tunquin, worshipped by the Chingalese, but

13. A sprig with leaf of the bogaw-tree, worshipped by the Chingalese, but not regarded in Tunquin.

14. Some sprigs of a shrub called Ki-to-hepe, much esteemed for its medicinal virtues.

15. A plant called Ki-luke. It is eaten raw with raw fish as a salad.

16. A plant called Ki-may. Bruised with salt, and applied to the leg, it alleviates pains in them from strains or weariness with walking.

17. A sprig of a shrub called Ki-vong, of strange virtue; for being put into water it driveth the crabs from it; and being put to the mouth of the holes, where they have burrowed themselves, they immediately run out, or are killed in their holes. And it is for that end used by the natives to catch them.

18. The Betele leaf, very well preserved in a book, so that the true shape may be seen.

19. The sprigs of a tree called Ki-coy. This is the plant, with which they dye their cloth black in this manner: They boil the leaves in water, and then dip their cloth in it: then dipping their cloth in mud, as at Ceylon, it turns of a perfect black.

20. A sprig of the kitule-tree; the virtues of which tree are described in the *History of Ceylon*.

21. The leaves of the *dentro ordatra*, called by the Chingalese, attuna atta, but by the Tunquinese ki-karroek. It is of a strange intoxicating nature. See LIN-SCHOTEN.

22. The seed of the Tunquin oranges, the best in the world.

23. The seed of a certain bean or pea that grows in Java, and is there eaten commonly as pea or beans are here.

24. The seeds of water-melons, which grow in the island of St. Jago. One of the melons was from thence carried to Tunquin very fair and fresh; and being there eaten, the seeds taken out of the melon grew and throve very well, though they had none of them in that country; and so, it was hoped, they might do in England.

25. The Lichen plumbs, accounted the best plumbs of China.

26. The plumbs called in the Chingalese Murtas, growing also plentifully in Tunquin. It is both pleasant and wholesome to eat.

27. The seed, with which they make oil, not much different from our linseed oil, being used for painting; as also for burning in lamps, and of great use for anointing for any pains of the body. In the Chingalese language it is called Endra-atta; in Tunquin, Hot-to-doo.

28. The seeds of a plant, called in the Tunquin language Hot-com-gon; in the Chingalese language Kermda-etta.

29. The seeds of the Deutro, used in the Indies for intoxicating. See SPRAT'S *History of the Royal Society*.

November 24, at a meeting of the COUNCIL at Mr. Hooke's lodgings were present,

Mr. HENSHAW

Mr. HILL

Sir JOHN HOSKYNs president

Mr. MEREDITH.

Mr. PERRY.

The minutes of the last council were read.

It was ordered, that Mr. ASTON be desired to take care, that the papers needful be brought to the Society on the Wednesday following, and on St. Andrew's day; and Mr. HUNT was ordered to speak with him for that purpose: That Mr.

The minutes of the following council were taken by the president.

PACET

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# ROYAL SOCIETY OF LONDON.

PAOR be excused from payment due at Michaelmas; and that Mr. quain him, that something of his work was expected: And,

That a present be made from the Society to Mr. KNOX; and that it be 50 s. or 3 l. value.

It was resolved, that it is the opinion of the council, that Mr. Hooke be owned and assisted by the Society as far as lawfully they may, and is able by the orders and journals of the Society.

It was ordered that Mr. Hooke have 15 l. upon account, as part of what he is to have, when he brings in the account of the experiments made this year: And

That inquiry be made for such a clerk for the Society, as may perform the laborious part of the secretaries office.

November 27, at a meeting of the COUNCIL were present.

Sir JOHN HOSKINS president

Sir ANTHONY DEANE  
Dr. HOLDER  
Mr. EVELYN  
Dr. GREW

Dr. SLARE  
Mr. PERRY  
Mr. MEREDITH  
Mr. CREED.

The minutes of the last council were read.

Dr. VINCENT and Mr. BAILEY were propounded, in order to their being elected fellows, and approved.

Resolved, that Mr. WALLER's translation of the Florentine experiments be censured: And

That Mr. CRAMER be clerk to the Society in WICKS's place, and be subject to the directions of the secretaries in the service of the Society, and have about 40 l. per ann. or as can be agreed: and that Mr. WICKS be told, that his attendance is of no farther use:

That the ledger and journal books of the Society be brought in a box every meeting, as by former orders, and be shut up when the president is in the chair: And

That a list of all the papers and books in the secretaries custody be kept in the treasurer's chest, and be called over before two of the council at the beginning of the secretaries entering upon their office after election.

Mr. Hooke acquainted the council, that he intended to write an historical account of the experiments, which he had shewed before the Society, together with a de-

a declaration of the use and confectaries of each, and an idea of natural philosophy built upon them: and he desired, that the experiments not heretofore clearly made, and which were imperfectly entered, might be repeated at the Society's charge: which was ordered accordingly, with this addition, that at the meeting before any such experiment made, he should give the Society notice, that such as pleased might be present.

November 28, at a meeting of the Society, Sir JOHN HOSKYNs president in the chair.

DR. NATHANAEL VINCENT and Mr. EDWARD BAILEY were proposed to the Society as candidates by the president.

A letter of Dr. WALLIS to Dr. PLOT, dated at Oxford November 16, 1683,<sup>1</sup> was read, concerning an ancient mantle-tree in Northamptonshire, on which the date of it (for the year of our LORD 1133) is expressed by numeral figures; which shews the great antiquity of those figures in England.

A letter from GRIFFITH HATLEY, M. D. to Dr. GREW, dated at Maidstone in Kent, November 12, 1683<sup>2</sup>, was read, concerning a bed of shells found about six feet under ground at Hunton in Kent about five miles from Maidstone, and a mile from the river Medway. These shells were supposed by Dr. HATLEY to be *lapides sui generis*, and not shells petrified.

Two letters from Mr. MUSGRAVE to Mr. ASTON were read, one dated at New-college, Oxford, November 17, 1683<sup>3</sup>, the other November 26<sup>4</sup>; both mentioning some experiments there tried, viz.

That filing takes off the polarity of iron:  
That a knife touched with a magnet after whetting attracts more than before:  
That a rough magnet struck with a hammer seems to emit bristles, which are the *ramensulae* of the stone: And,  
That the needle turns just at the center of gravity.

There was also an account of several electrical bodies; of metallic earths; and other such: this of promiscuous use.

Mr. HOOKE delivered in a box for the repository the curiosities given by Captain KNOX, which had been shewn at the last meeting.

Mr. HOOKE shewed an instrument, which was one part of a way-wiser; his account of which was as follows<sup>5</sup>.

<sup>1</sup> Letter-book, Vol. ix. p. 46. It is printed in the *Philosoph. Transact.* N<sup>o</sup> 154. p. 399. for December 1683.

<sup>2</sup> Letter-book, Vol. ix. p. 42. It is printed in

the *Philosoph. Transact.* N<sup>o</sup> 155. p. 463.

<sup>3</sup> Letter-book, Vol. ix. p. 52.

<sup>4</sup> Ibid. p. 54.

<sup>5</sup> Register, Vol. vi. p. 84.

"I shewed an instrument I had contrived, and shewed some of the  
 "about twenty years since, by which the way of a ship through the sea  
 "exactly measured, as also the velocity of any running water or river, and  
 "the comparative velocity of it in its several parts. By this also the quantity  
 "the water vented by any river into the sea, or any other river, and  
 "It was one part of a way-wiser for the sea, the whole engine, might  
 "I keep a true account, not only of the length together of the run of the ship  
 "water, but the true rumb or leeward way, together with all the ship  
 "workings of the ship. This part of the engine, now shewn was the  
 "or first mover of the whole, feeling as it were, and distinguishing the  
 "qualifications of the ship's course; but was to be regulated by the  
 "additions in the completed engine, which I design shortly to get executed."

A letter of Mr. HAVELIUS to Mr. ASTON, dated at Dantzick 30 September  
 1683 \*, was read, giving an account of the last comet seen at Dantzick from July  
 30, to September 4, 1683 \*, and prefcribing some conditions for a bookeller,  
 who would undertake to print his *Uranographia* and globes.

November 30, the day of the anniversary election of the council and officers for  
 the year ensuing :

Dr. NATHANIEL VINCENT and Mr. EDWARD BAILEY were elected fellows.

Mr. BOYLE sent a depositum of an *arcanium* to remain sealed in the custody of  
 the secretary.  
 He likewise presented a piece of native cinnabar.

The secretary having read the statutes for election of officers, the president  
 drew the two scrutators by lot, who were JOHN HERBERT, Esq; and Mr. ED-  
 WARD PIGOT.

The Society then elected out of the old council the following eleven persons,  
 who should remain still of the council for another year, viz.

Sir JOHN HOSKINS	Mr. HILL
Sir JOSEPH WILLIAMSON	Mr. MEREDITH
Sir CYRIL WYCHE	Dr. GREW
Sir CHRISTOPHER WREN	Dr. PLOT
Mr. HENSHAW	Mr. ASTON.
Mr. COLWALL	

There were then ten others elected out of the Society into the council, viz.

GEORGE EARL of BERKLEY	Dr. GALE
Sir ROBERT REDDING	Dr. TYSON
Dr. AGLIONBY	Mr. LISTER
Dr. BROWN	Mr. FLAMSTEAD
Dr. CROUNE	Mr. HALLIV.

\* Letter-book, vol. ix. p. 57.

\* It is printed in the Philosoph. Transact. N<sup>o</sup> 154. p. 416.

The Society then proceeded to elect the president and other officers, and accordingly chose Sir CYRIL WYCHE president by thirty voices out of forty-three; Mr. HILL treasurer, and Dr. PLOT and Mr. ASTON secretaries, as the last year.

Then the oath of office was administered to the new president, and the ten persons newly chosen into the council by the following persons, Sir JOHN HOSKINS, Sir CHRISTOPHER WREN, Mr. HENSHAW, Mr. MEREDITH, Mr. HILL, Mr. PERRY, Dr. PLOT, Mr. ASTON, &c.

Not long before this anniversary election the Society lost by death, an eminent member,

Mr. JOHN COLLINS, born at Wood-Eaton near Oxford, on Saturday March 5, 1627, and son of a non-conformist divine, who, though not suffered to preach in church, was permitted to do so in prisons to malefactors, which with correcting the press afforded him a subsistence. At sixteen years of age Mr. COLLINS was put apprentice to Mr. THOMAS ALLAM, a bookseller without the Turl-gate of Oxford; but the war between the king and parliament breaking out soon after, he left that trade, and was employed in clerkship under, and received some mathematical knowledge, from Mr. JOHN MARR, one of the clerks of the kitchen to the Prince of Wales, eminent for his skill in mathematics, and for ~~his~~ *his* ~~various~~ *various* ~~trials~~ *trials*, with which the gardens of King CHARLES I. were adorned. But the intestine troubles and confusions increasing, Mr. COLLINS lost that employment, and went to sea seven years, most part of which was in an English merchant-man, that became a man of war in the Venetian service against the Turks; in which having leisure, he applied part of his study to the mathematics and merchants accounts; and upon his return to England taught them together with writing<sup>a</sup>; and in 1652 published *An Introduction to Merchants Accounts*, which had been drawn up for the use of his scholars. It was reprinted in 1665, but the greatest part of the impression was consumed in the fire of London the year following. A new edition was published in 1674, in fol. with the addition of two more accounts. His *Seller on a Quadrant*; or a *Treatise containing the Description and Use of four several Quadrants*, &c. was printed at London 1658, in 4to, as his *Mirrior's plain Scale new plain'd*, and his *Treatise of geometrical Dialling*, were the year following. In 1664 he published at London in a quarter of a sheet, *The Doctrine of Decimal Arithmetic, Simple Interest, &c. as also of Compound Interest and Annuities, generally performed for any Time of Payment*. After the restoration he was appointed accountant to the excise-office, then kept in Bartholomew-Lane near the Royal Exchange. October 10, 1667, he was propos'd candidate for election into the Royal Society by Dr. SETH WARD, Bishop of Salisbury, and on the 17th of that month was chosen a member of it, several of his pieces being printed in the *Philosophical Transactions*.

In March 1668, he had an offer of an employment in Ireland, but had no great inclination to leave his own country<sup>b</sup>.

<sup>a</sup> Wood, Fasti Oxon. vol. ii. p. 117.

<sup>b</sup> Copy of a letter of his, dated March 11,

1668, among Dr. PELL's papers.

He was nominated by the Earl of Shaftesbury, while Lord High Chancellor, in divers references concerning suits depending in Chancery about the accounts, to assist in the stating thereof; which he performed with such exactness that his reputation in that respect occasioned him to be much employed in places and by other persons.

Upon the loss of his place in the Excise-office, and of that under the commission of accounts, he was recommended by Sir PHILIP WARWICK in a letter\* dated May 1670, to Sir JOHN Trevor, one of the principal Secretaries of state, as long known to, and respected by him for his great and useful parts, and greater modesty; and that, besides his knowledge of mathematics and accounts, he was a great matter of trade: "I conceive, added Sir PHILIP, he takes better measures of it, and knows the hinges it turns on better than any of us." "I have met with, and can rectify the methods of several accounts relating to the navy and such affairs, if he be leisurely dealt with, for he neither makes noise nor shew. I find (for he is neither covetous nor greedy) he could reckon 200 l. per ann. for a reasonable subsistence; which if his Majesty and my Lords Commissioners think fit to buy him at, sure he may be set on work immediately upon such subjects, as he will soon earn his wages, though it be an extraordinary allowance; and the next commissioners of appeals may take which falls in the Excise (which is now rather a bounty than a salary place, off that extraordinary charge." Sir PHILIP WARWICK wrote another letter in his favour, August 6, 1677, to Mr. BRENT, inclosing a paper recommending stiled him *A man of good arts, and yet great simplicity; able, but not covetous*; and observed, that he had deserved, when he was in employment, the small pension assigned him, when he quitted that employment. Sir PHILIP wrote a third letter of recommendation, October 31, 1678, to CHARLES BERTIE, Esq. Secretary to the Lord Treasurer, mentioning, that in the small office, which Mr. COLLINS had in the Excise while the Earl of Southampton was Treasurer, he was very truly to his charge, and very careful in the true stating of the accounts at Brooke-house; and that he could have very ample testimonies of his services attending the commissioners, and more lately in his office of accountant to the Royal Fishery company. "But as a man, continued Sir PHILIP, that hath attended more his business than himself, he fell short of receiving those salaries, which were promised him; but I contract myself and my suit to you, and pray you to represent it, if it would do any good, in my name to my Lord Treasurer, that he having, upon dissolving the then commission for Excise, but a poor pension of fifty pounds per ann. settled on him by privy seal, and of which he is now five or six years in arrear, you would be instrumental to get him such a portion, as might be comfortable to him, and whereof, I assure you, he stands in great need for his family as well as for himself, his present subsistence being only sometimes taking some intricate accounts of merchants, which are litigious, and others, who call him thereunto upon such occasions. I extend my request somewhat farther, that if my Lord Treasurer have need of such a man's service, as he may probably upon the balance of trade or of a steady account of another nature, you

\* Copies of this and two following letters are extant among Dr. Paley's papers.

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66 would

"would remember him, and gain him some employment; for thus he will re-commend himself."

Mr COLLINS published at London in 1680 in 4to, *A Plea for bringing in of Irish Cattle, and keeping out of Fish caught by Foreigners*. His next piece was, *An Address to the Members of Parliament of the Counties of Cornwall and Devon about the Advancement of Tin, Fishery, and other Manufactures*. His book intitled *Salt and Fishes* was printed at London 1682 in 4to: but his *Arithmetic in whole Numbers and Fractions, both vulgar and decimal, with Tables for the Forbearance and Rebate of Money, &c.* did not appear till some years after his death, being published at London in 1688, in 12mo, by Mr. THOMAS PLANT, accountant.

After the act at Oxford, July 10, 1682, riding from thence to Malmesbury in Wiltshire, in order to view the ground to be cut for a river between the Isis and Avon, and drinking cider while he was hot, he contracted an asthma and consumption, which at length put an end to his life at his lodging on Garlick-hill in London, on Saturday November 10, 1683, his body being interred, on the Tuesday following, in the parish church of St. James Garlick-hill, in the south isle just behind the pulpit<sup>4</sup>.

About five and twenty years after his death, all his papers and most of his books came into the hands of Mr. WILLIAM JONES, F. R. S. amongst which were found manuscripts upon mathematical subjects of Mr. BRIGGS, Mr. OUGHTRED, Dr. PELL, Dr. SCARBURGH, Dr. BARROW, and Mr. ISAAC NEWTON, with a multitude of letters received from, and copies of letters sent to, many learned persons, particularly Dr. PELL, Dr. WALLIS, Dr. BARROW, Mr. NEWTON, Mr. JAMES GREGORY, Mr. FLAMSTEAD, Mr. THOMAS BAKER, Mr. BRANCKER, Dr. EDWARD BERNARD, Monsr. SLUSIUS, Monsr. LEIBNITZ, Monsr. TSCHIRNAUS, Father BERTET, and others.

From these papers it appeared, that Mr. COLLINS was so solicitous in his search after useful truths, so indefatigably industrious in prosecuting these inquiries, and of so communicative a disposition, that he held a constant correspondence for many years with all the eminent mathematicians of his time, and spared neither pains nor cost to procure what was requisite to promote real science; so that the world was obliged to him for the greatest part of the late discoveries in all useful learning<sup>5</sup>. It was from his papers chiefly, that the great NEWTON's claim to the invention of fluxions was established, as may be seen in the *Commercium Epistolicum* D. JOHANNI COLLINS & aliorum de *Analysi promotâ, jussu Regiæ Societatis lucem editum*, London 1712, in 4to.

Another of the Society's Members, who appears to have died in the year 1683, was

<sup>4</sup> WOOD, ubi supra, col. 117.

<sup>5</sup> See farther concerning his character and merits of him the article in the GENERAL DICTIO-

NARY HIST. AND CRITICAL, Vol. IV. p. 406, 407, and the notes B and C.

1683]

# ROYAL SOCIETY OF LONDON.

JOHN BEAL, D. D. who was defended of a good family in Herefordshire, he was born<sup>1</sup>, being nephew of Sir WILLIAM PYKE, attorney of the Court of Wards, and educated at first at Worcester College<sup>2</sup>, and thence removed to Eaton college<sup>3</sup>, from which he was transplanted to a college in Cambridge, where he read philosophy to the students for two years<sup>4</sup>. At his entrance into that university, he found the writings of the Ramists in esteem, from which they sunk within three or four years after, without a solid truth and reasonable discourses. And the same fate soon after prevailed in both universities, though defended by the public professors, COLLINS and PRIDEAUX, by swarms of writers and disputants, the noise of which pretences of zeal, and the juncture of many foreign and national pulpits, all tendencies<sup>5</sup>. Mr. BEAL spent some time in his travels abroad, being at Orleans in France in 1636, when he was thirty three years of age<sup>6</sup>. His love of learning and zeal for the promotion of all the most useful parts of it engaged him in correspondence with Mr. SAMUEL HARTLIB, and afterwards with Mr. BOYLE, many of his letters to the latter being published in the fifth volume of the works of that great man.

His zeal for the plantation of orchards for the making of cider was hereditary, his great grandfather and father being eminent for the same<sup>7</sup>. In consequence of this he wrote two letters addressed to Mr. HARTLIB, which were printed by ROGER DANIEL the printer, in 1666, with the title of *Herefordshire Orchards a Pattern for England*; within a few years after which, that county gained some hundred thousand pounds sterling by the fame of their orchards<sup>8</sup>. He resided chiefly at Hereford till the year 1660, when he became rector of Ywor in Somersetshire, where he resided till his death.

He was an early member of the Royal Society, being declared an honorary one, January 7, 1662, and elected a fellow of it on the 21st of the same month. He was promoted to be chaplain to King CHARLES in 1665, and was likewise doctor of divinity. Several of his papers are printed in the *Philosophical Transactions*. He was a man of excellent parts, extensive learning, and great public spirit; and the character, which his friend Mr. HARTLIB, gave of him in a letter to Mr. BOYLE<sup>9</sup>, was, that there was not the like man in this island or continent, who could be made more universally useful.

Decemb. 5. Sir CYRIL WYCHE president in the chair.

Dr. VINCENT was admitted fellow.

<sup>1</sup> BOYLE's works, vol. v. p. 440.

<sup>2</sup> Ibid. p. 429.

<sup>3</sup> In a letter of his to Mr. BOYLE, dated July 1, 1681, p. 508, he mentions his entering into his eightieth year.

<sup>4</sup> P. 425.

<sup>5</sup> Ibid.

<sup>6</sup> P. 441, 444.

being then

1 P. 453.

= P. 453.

<sup>7</sup> Mr. BEAL's letter to Mr. EVELYN, Decemb. 12, 1662: Supplement to the letter-books, vol. I. p. 158.

<sup>8</sup> Ibid. p. 4-5.

<sup>9</sup> Life of Mr. BOYLE, p. 115, edit. 1744, 6vo.

<sup>10</sup> Of April 27, 1698, BOYLE's works, vol. v. p. 215.

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Upon

Upon mentioning Dr. HATLEY's letter, read at the meeting of November 28, it was desired, that some of the turbinated and bivalvous shells might be sent up and considered of.

Some magnetical experiments being mentioned as made at Oxford, it was required, that the three following should be tried at the next meeting.

1. To strike a load-stone with a hammer, and to see the *raments* hang upon the stone.
2. To file a touched iron, to try whether the polarity be lost.
3. To see whether a needle begins to turn just at the center of gravity.

Mr. HALLEY queried, in a ship's passing the line towards the Indies about what place the southol became strongest? The inquiry was recommended to be made by Mr. BAILEY.

Upon Mr. HEVELIUS's letter concerning the printing his *Uranographia*, &c. it was ordered, that Dr GALE or the secretary should speak to Mr. CHISWELL, to know whether he would undertake the doing it on the conditions offered.

Upon mentioning Dr. WALLIS's account of the numeral figures, Dr. GALE remarked, that these figures had been used in France above 100 years sooner, in about 1005, having been introduced by GERBERTUS.

A letter of Mr. MUSGRAVE to Dr. TYSON, dated at New-college, Oxford, December 1, 1683, was read, containing some observations made by a friend of his on the lumbricus latus; that in the middle of the joint on one side was a foramen, and from that place downwards a body like an ant, seeming to be inclosed in the skin, &c. Dr. TYSON was desired to procure, if he could, some of the worm, and report how he finds it agree with this account.

Mr. HOOKE brought in a model of a balance for finding any desired part of a weight given. The beam was suspended, and poised in a part, from which one arm was ten times as long as the other. The scales also were one to the other as ten to one.

Decemb. 12, at a meeting of the COUNCIL were present

Sir CYRIL WYCH president

Sir JOHN HOSKINS  
Sir ROBERT KEDDING  
Dr. BROWN  
Dr. TYSON  
Dr. GREW  
Dr. LISTER

Mr. HILL  
Mr. MEREDITH  
Dr. PLOT  
Mr. FLAMSTEAD  
Mr. ASTON.

\* Letter-book, vol. ix. p. 50.  
\* It is entered in the Register, vol. vi. p. 85.

and printed in his *Philos. Experimenti*, &c. p. 113.

1683.] ROYAL SOCIETY OF LONDON.  
The council debating the legality of holding a council without a  
caused the minutes of the three preceding councils to be read over, and  
following alterations:

Whereas November 27th one CRAMER was chosen clerk in Mr. WICKES's place,  
that election was declared void, because, according to the charter, the clerk  
ought to be chosen by the whole Society, in the same manner as the treasurer and  
secretaries.

It was ordered, that the president, Sir JOHN HOSKYNES, Mr. COLWALL, Mr.  
MEREDITH, and Mr. ASTON, do meet as a committee for the speedy auditing  
the treasurer's accounts.

Mr. HOOKE being sent for in, and required to deliver to the secretaries  
the written account of the experiments made by him as curator during the last  
half year, he promised to deliver the said account to Mr. ASTON by Christmas-  
day.

The council recommended to Mr. HOOKE the retrieving and delivering to be  
entered such other experiments, as had been made by him as curator during the  
last seven years.

Mr. HOOKE was desired, when he should make any experiment at the Society's  
charge, to acquaint them with it the week before, and to have their consents; some  
persons, if it should be thought necessary, being appointed to be present at the  
making of the experiment.

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE president in  
the chair.

A letter was read from Dr. HATLEY to Mr. ASTON, dated at Maidstone  
Decemb. 10, 1683, promising to send some of the figured stones found at Hun-  
ton in Kent.

In the mean time Dr. GREW having had some of them formerly sent him, offer-  
ed them to the Society. The turbines was declared by Dr. LISTER to be a stone  
undescribed, either by himself or Dr. PLOT. The bivalve was so imperfect, as  
not to suffer a judgment to be made of it. The inner part of the stones seemed  
to partake of the nature of the marl, where they were found, as being dissolvable  
in water. The outward part of the stone being more hard, was judged by Dr.  
LISTER to be a selenites; but Mr. HOOKE took it to be a shell.

To this Dr. LISTER answered, that there was no shell-fish known, that an-  
swered either this stone, or any one of the cochlees of England, whereof there  
are forty or fifty sorts.

Letter-book, vol. ix. p. 55.

Mr.

Mr. HOOKE mentioned a place, where shells falling upon a shore were petrified, some more some less, as they lay more or longer in the water.

Dr. LISTER did not deny the petrification of shells, but he denied any alteration, which might make them like the cochlites found in England. He appealed also to any trial to be made in petrifying water. He said, that some petrifications left the shell quite intire, but incruited with stone within and without, as one, which he shewed, belonging to the repository. Other petrifications increase the weight of a shell; but it appears still the same it was formerly, without any outward alteration.

Mr. HOOKE having mentioned several sorts of petrified oysters, Dr. LISTER seemed to allow but two sorts of oysters in Europe, with either of which the rock oyster-shells had no similitude, as having no striae on the outside going from the valve to the rim.

Upon viewing a snail-shell incruited with stone within and without, Dr. VINCENT said, that there was a petrified skull in Sidney college in Cambridge, so that the skull might easily be scraped out from the stone. This had been brought out of Candia in the reign of King JAMES I.

Dr. PLOT shewed an experiment, how the *ramenta* start out of the load-stone, when it is struck with an hammer: and he affirmed, that such *ramenta* do not appear, where a load-stone is struck with a brass pestle: but this was not tried.

A piece of iron, that had been touched with a magnet, was filed; but there was yet some doubt, that the iron retained its polarity.

Mr. HOOKE proposed the trial, whether grinding a loadstone would destroy its polarity; though it were true, that filing would confound it.

It was also queried whether the touching of a needle penetrates it, and gives a virtue to the inner part of the iron.

Mr. HOOKE read a paper concerning the use and convenience of the beam or steelyard proposed at the last meeting\*.

He also promised, that such a beam should be made, and shewed the Society at their next meeting.

Dr. GREW produced some crystals of talc found by Mr. STEPHENSON at Dedham in Essex. They lay in deep wells in a blackish loam. He observed, that the same are found upon the cliffs of Walton in the Naze in the same sort of earth. Half a bushel of them may be got in a day. The water, where the talc is found, upon the first opening the ground, purges.

\* This paper is entered in the register, vol. vi. p. 88. and printed in his *Philos. Experiments*, p. 116. He

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He also produced a hard spar, that will cut glass clustered in little pieces like gum ammoniac, found in the same place. This he took to be a silver ore, but poor; and not worth the working.

Mr. HOOKE shewed a sort of glistening ore, which, Dr. LISTER said, was as call-  
ed *thrylle-brogt*; and that it yielded its silver easily, but that the quantity was not great.

Mr. EVELYN remarked, that he had been lately informed of a silver mine in Norway, that was 600 fathoms deep.

Mr. HOOKE shewed a way to weigh gold, &c. and at the same time to examine the bulk. The body to be weighed in water was hung from an helical coil of wire. The weight was to be judged from a body placed within the helical coil divided conveniently. The trial herof was not made, the apparatus being only contrived to shew the manner how the thing was to be done.

A treatise of Dr. SLARE on the *calculus humanus* was read, wherein not only several received opinions concerning it were refuted, but the true nature of it was substantially examined by the help of chemistry and hydrostatics.

The calculus was found to partake more of the nature of bone than of stone.

He shewed the *effa alba* of VAN HELMONT.

Dr. LISTER having formerly found the *caput mortuum* of the stone applied to the magnet, found, that some of it did so now, though it had not been above an hour in the fire. He therefore desired, that the calcination of the *caput mortuum* might be longer continued, whereby it would yet become more magnetic.

It was objected, that most bodies would turn magnetical by the fire.

Dr. LISTER was of the opinion, that the pyrites only did so: and he observed, that he had seen two sorts of *calcelli urinae*, one opaque, and another transparent, which had been brought in by Dr. GREW, and was very like the shooting of the pyrites.

Dr. GREW remarked with regard to that part of the stone not being made by acids, that a rigor usually preceded a fit; that the drinking of March beer often occasioned a fit, which beer is allowed to have an acidity: and that things correcting acidity were good for the stone.

He took notice of the confirming an experiment tried by himself, that stones were wrought on by no acid, but nitrous.

\* It is entered in the register, vol. vi. p. 1. and printed in the *Philos. Transact.* N<sup>o</sup>. 157. p. 523.

Dr. SLARE

Dr. SLARE said, that he had weigh'd the stone brought from the D. of N. by Sir THEODORE DE VAUX, and found it to be four ounces and seven drachms.

December 19, Sir CYRIL WYCHE president in the chair.

Mr. BAILEY subscribed the charter-book, and was admitted, promising to give bond at the next meeting.

The minutes of the preceding meeting were read.

Two letters from Oxford were read, the latter whereof contained some astronomical and geographical observations of Mr. JOHN GREAVES, transcribed from his own manuscript, and sent by Dr. THOMAS SMITH; which were ordered to be put into the hands of Mr. HALLEY to be considered, and an account of them to be given to the Society at the next meeting. They are as follow<sup>e</sup>:

"Declinatio acus magnetice a meridiano Alexandriæ occidentem versus, & multis observationibus usque accuratis 5° 45'.

"Altitudo poli Alexandriæ 31° 10', licet in iisdem ephemeridibus alibi dicitur 31° 5', alibi tantum 3' minut.

"The sun's meridian altitude taken at Galata by Constantinople 11th March, 1637, O. S. 49°  $\frac{1}{2}$  49° 18' 36'' Sun in Aries 1° 5' Decl. Bor. 0° 26' Altitudo poli Constantinopolis 41° 7'.

"SNELLIUS supposes the altitude of the equinoctial at Alexandria to be 58° 58', and so the pole to be raised there but 31° 2'.	} At Rhodes Sept 11th, 1638. 53 : $\frac{1}{2}$ : 53 : 53 At Alexandria 19th Dec. 1638, 35 : $\frac{1}{2}$ : 35° 40' 12''.

"The variation of the needle at Rome, March 17th N. S.  $\frac{1}{2}$  of a degree east.

"Of Leghorn March 14, O. S. 50' to the east.

"The obliquity of the Zodiack 1639, 23° 30' 15''.

"The colours of the planets and of the stars in Ægypt not different at all from what the ancient astronomers observe, and from what we see in England.

"At the rising and setting of the sun in Ægypt, especially about Alexandria, there is great store of vapours. At a good distance from the horizon the body of the sun grows ruddy, and appears bigger than it usually seems to be in England.

"Few nights, and those without wind, that he could see the stars near the horizon. For which he alledgeth this reason, because when the winds blow they

<sup>a</sup> Later-book, Vol. ix. p. 81.

<sup>a</sup> raised

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 " raise a great quantity of sand, which oftentimes makes the sky to look  
 " it is hazy weather in England.

" He could observe no spots in the sun for several weeks together in  
 " end of January, February and March. On the 5th of April, three <sup>the latter</sup> little spots in  
 " the sun, two close together.

" The diameter of the sun taken Jan. 25, O. S. 2 hours 4<sup>1</sup>/<sub>2</sub> P. m. and so  
 " again 4 hours p. m. was 35' 25".

" Jan. 29, O. S. 1638, about 5 hours p. m. he found the same diameter.

" His eyes were hurt with gazing upon the sun; so that for several days after  
 " there appeared to the eye, with which he had observed, as it were a company of  
 " crows, flying together in the air at a good distance.

" POSIDONIUS, as CLEOMEDES writes, observed the altitude of Canopus at  
 " Alexandria to be 74°: he observed it to be but 6 and almost 7.

" The Jewish passover began on Monday night 8th April, O. S. 1639, at A.  
 " Alexandria; so that Tuesday the 9th of April was the 15th of Nisan.

" At this day, he says, there be but four channels or ostia of Nilus, two natu-  
 " ral, Damietta and Rosetto, which make the Delta, and part some 20 miles below  
 " Cairo, and two artificial, the one on the south side of Alexandria, and hath  
 " its beginning four thirty miles above Rosetto. By this all merchandise was  
 " anciently brought to Alexandria, which now comes from Rosetto to Giermas  
 " with great uncertainty, by reason that bocca of Nile is very dangerous; both  
 " because of the NW. and NNW. winds, which bar in all those ships and vessels,  
 " as also for the sands and shallows, which at the overflowing of the Nile good  
 " ships may pass. The other artificial channel is at Boulas, where it falls into  
 " the Delta: into a sinus of the sea, that is in the mid-way between Rosetto and  
 " Damietta, and like to that at Madaga, which is in the mid-way between Alex-  
 " andria and Rosetto, between these two places about forty miles English.

" Rosetto lies from Alexandria E by S.

" The courses of Nilus, allowing for the several turnings, SSE. Wherefore Mem-  
 " phis and Rhodes cannot be in the same meridian, nor Rhodes. For from  
 " Rhodes they sail SSE to Alexandria.

" On land, about three miles from Shienon, you may see the pyramids, which  
 " lie W. of it at the distance of between fifty and sixty miles.

" PROTOBY's pillar at Alexandria, as it is commonly called, is of Corinthian  
 " work. He says, that he had seen two or three Greek characters on the plin-  
 " thus to the sea-side. On the west side of the plinthus ΔΙΟ ΟΣ.  
 " Vol. IV. 11

" At

" At Cairo, where they hatch chickens by an artificial warmth, they know by looking on a new laid egg, of what colour the chicken will be; as also whether it be a cock or a hen.

In a paper containing an account of the mountains of the earth, according to the Arabians, he has this note :

" That Mount Sina reaches to the Red Sea, is confirmed by the geographers and travellers of our times. One thing is remarkable, which neither historian, nor any other, that I know of, make mention of, and that is this : That the rocks are there of a goodly speckled kind of marble, the colour being red, with some mixture of black and white. From whence almost all the choicest pillars, and huge vast stones, that are now in the world, have been brought down the Red Sea, and so conveyed to the Nilus, by which they have been carried up to Thebes, or down to Alexandria, and other places. I have seen wonderful fair and great stones, that have been brought antiently from Mount Sina, whereof some of them are in the pyramids, others are made into obelisks and pillars : those pieces both at Constantinople and Rome, which are so huge and vast, those goodly pillars, which are in the pantheon built by Agrippa, as also the agulhas full of Egyptian hieroglyphics, have all had their original from hence. This I may the more confidently avow, because a learned man, a Venetian, who had been some pretty while at Mount Sina, and whom I knew to be very curious, assured me, that he had seen some pillars there, which were almost finished, but by casualty had been left imperfect, and not brought away : and that for many miles there were huge rocks and mountains of this red marble speckled with black and white. Of which kind all the antient fabrics of Egypt consisted. And besides this place of Mount Sina, all their other quarries and hills are of a kind of white free stone, like ours : wherefore they could not have them from thence, but from those of Mount Sina."

Mr. Hooke produced a steelyard, whose beam was to a third proportion ; where-by he shewed the conveniency of weighing of bodies with a less number of weights, than usually is done any other way, and declared, that he designed no more by this steelyard than the giving of an aliquot part of any assigned weight ; so that for any different division of weight there must be a different steelyard. His account of it was as follows :

" I shewed a pair of scales and weights made by order of the Society. The beam was made for triplicating or tertiating any weight small enough to be weighed by it. And the use of it was for accommodating our European weights to those of India. So that with a pile of weights of 21  $\frac{1}{2}$  pounds Troy weight, any body to 64 pounds Troy could be exactly weighed. So that almost a single cundarine would turn the scale, when charged with that weight. Which cundarine is but the thousandth part of our pound Troy.

" These sort of scales will be of excellent use for weighing of great weights, be-

\* Register, vol. vi. p. 91, 92.

" cause

" cause the beam may with ease be so made, as that one twentieth part of the weights may serve, and the beam and triangle need not be much more than of half the strength and weight, and yet the beam more nice and curious than the best made the ordinary way. Nor is this at all the same with the butcher's steelyard, this having scales as ordinary beams, and as great variety of weights, though each of them be but one twentieth part of the weights necessary to be used in the common way. And whereas in a tun weight there are not less than forty half hundred weights necessary sometimes to be removed from place to place; in this way one pile of weights, amounting in all to one hundred weight, will lully and more exactly perform it; and any weight may be weighed exactly thereby, that is not less than a scruple, nor bigger or heavier than a tun, which I think is not to be done by any beam yet used."

Upon producing this steelyard, Mons. JUSTEL remarked, that steelyards were used in France, which would weigh bodies to the two thousandth part of a grain.

A letter of Dr. LISTER to Mr. ASTON was read concerning the nature of earthquakes, more particularly of the origin of the matter of them from pyrites alone\*.

Upon which a member of the Society desired, that Dr. LISTER might be asked, whether he could produce any history of an earthquake, wherein the vapour took fire.

Another letter from Dr. LISTER to Mr. ASTON, dated 12 December 1683, was then read, concerning the stone\*, pursuant to a paper of Dr. SLARE, on the same subject, read at the preceding meeting. It was as follows:

" In the year 1677, I published a notion in the preface to one of the tracts, *De Cœlesti Anglia*, that there were but two only *Succi lapidescentes* in nature, that I knew of, viz. the vitriolic, proceeding from the pyrites, and the succus calcarius proceeding from that genus of fossils: And I did there promise I would further discourse of them.

" Which I have since performed in the tract *De fontibus medicatis Angliæ*; the design of that book being to fix the true characteristics notes of those two lapidescent juices, and to explain the nature of them, and to shew the great concern they have in almost all our medicinal waters. This in the first part.

" In the second part of that tract (which is now in the press) I have briefly endeavoured to shew, that as there are but two lapidescent juices in nature without us; so these two are the only material causes of the stone, whenever it shall happen to be bred within us: For that the ways to distinguish them without us, will serve also to demonstrate their existence, when found in our bodies, as if vitriolic, the application of the loadstone, &c.

\* Letter-book, Vol. ix. p. 72. It is printed in the Philosoph. Trans. N<sup>o</sup> 157. p. 512. for March 1684.  
 \* Letter-book, Vol. ix. p. 71.

" That from these two juices not only animals of all sorts must be diseased, but that they owe the matter of their more solid parts to them: the bones of sanguineous animals, and the shells of testaceous being of the same nature, and some vegetables are wholly fed and nourished by them.

" Which makes the elegant and learned discourse of Dr. SLARE, read the last meeting to the Society, to be in my judgment so very near the explicating the true nature of the stone, as nothing yet I know of, has appeared like it.

" He having very rationally deduced the disease of the stone from the perverted juices of the bones, or the abrasions of them. And I only add, that the bones themselves are fed of petrescent juices.

" As for the reason of the disease of the stone in man, how people come sometimes to be plagued with that, which nature designed them for good, I refer (because it would be too tedious here) to the tract itself; every body being left to his own sense and thoughts concerning the manner of understanding the causes of things; which I think, however different, will never injure philosophy or real friendship."

Mr. HOOKE read a paper concerning his way of weighing bodies by a helical coil, whereby not only the quantity of the weight of any body should be discovered, but likewise the quantities of it; as in the mixture of any metal, &c. which, he said, could not be done so commodiously by any other instrument.

Mr. FLAMSTEAD's tables of the eclipses of JUPITER's Satellites were shewn; and it was desired, that they might be printed in the *Philosophical Transactions*.

Modf. BULLIALDUS's *Aritmetica infinitorum* was presented by him by the hands of Monf. JUSTEL.

1681. January 9, Sir CYRIL WYCHE president in the chair.

Mr. HALLEY having perused the paper of observations of Mr. JOHN GREAVES, collected

The latitude of Constantinople to be	40 : 71 Bor.
The latitude of Rhodes	36 : 47 Bor.
The latitude of Alexandria	31 : 4

The secretary then reading over the paper of Mr. GREAVES, it was very much doubted, that the great porphyry pillars and obelisks should be dug in Mount Sina, and thence brought to the Nile.

Dr. AGLIONBY was of the opinion of a late French author, that they were brought out of Upper Egypt.

<sup>1</sup> They are printed there, N<sup>o</sup> 154. p. 404.

Mr. Hooke thought, that the pyramids might be built upon a rock of such stone in the place where they stand.

This discourse giving occasion to mention Mr. VERNON, Mr. Hooke was desired to return the copy of Mr. VERNON's papers, which the Society had caused to be made of them.

The Lord MONTAGU \* being mentioned to have some observations of Mr. VERNON, Mr. HERBERT was desired to endeavour to procure a copy of them.

Mr. AUBREY also undertook, that Sir WILLIAM ESCOURT should be desired to give a copy of some papers of Mr. VERNON, which were in his hands.

The weather in Egypt being observed to be very hazy near the horizon, Mr. HALLEY remarked, that it was so in Guinea, and that the sun before his setting seemed to enter into a cloud, which he conceived not to be caused by sand raised by the wind, as Mr. GREAVES asserts.

Mr. HILL queried, whether the spots in the sun, seen by Mr. GREAVES, were not the same observed by GASSENDUS.

Mr. Hooke shewed the contrivance of a kind of balance, which would give any desired part of a weight \*.

The charges of one of these balances being but small, he was desired to get one well made by a good workman.

There were presented by Dr. Plot henna the flower of Cyprus, or ligufrum dried, which being mixed with water colours red, according to his account; a piece of rude coral from the Red Sea; a piece of zaffer, and a golden marcasite from Monmouthshire.

January 16, at a meeting of the COUNCIL were present,

Sir CYRIL WYCHE president

Dr. GREW

Mr. MEREDITH

Dr. BROWN

Mr. FLAMSTEAD

Dr. LISTER

Mr. HALL

Dr. AGLIONY

Mr. ASTON.

Mr. Hooke being sent to, but being absent, Mr. MEREDITH was desired to speak to him to deliver to the secretary the particulars of his experiments.

It was ordered, that the treasurer Mr. HILL do pay Dr. TYSON and Dr. SLARE 20 £. apiece, according to an order of council made Feb. 23. 1681.

\* RALPH, afterwards Earl and Duke of Montagu, whose secretary, during his embassy in France, Mr. VERNON had been.

\* It is entered in the Register, Vol. vi. p. 220. and printed in the Philosophical Experiments and Observations p. 118.

Some proposalls being read for regulating the business of the Society were referred to the next meeting of the council.

At a meeting of the Society on the same day, Sir CYRIL WYCHE president in the chair.

Upon the reading of the minutes of the last meeting, it was said, that the stone found in the place, where the pyramids stand, was not porphyry; and therefore that the porphyry made use of in the pyramids must be brought from another place.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, January 12, 1683<sup>1</sup>, being read, mentioning an ingot of cast iron, which the Philosophical Society at Oxford had made, which was not magnetical, it was questioned, whether cast iron would draw the needle as well as forged.

Dr. LISTER desired to be satisfied, that the ingot, which they had made, was iron; for that more is required to make iron than barely to melt down the iron stone. Hereupon he also mentioned the difference between iron ore and iron metal.

In Mr. MUSGRAVE's letter were also mentioned some observations of Dr. THOMAS SMITH in his voyage in 1668 to Constantinople: As 1. That it was tide and half tide in the Downs. 2. That the dolphin of the Greeks is our porpoise. 3. That there might be an under-current in the Straits mouth. This he proved by an instance of such a current in the Sound. The instance being strange and but one, it was desired, that the observation of it might be recommended to some able seamen upon occasion. 4. That upon the coast of Greece in 35° 53', the variation of the needle was 5° 22' westerly.

A letter of Dr. ROBERT HUNTINGTON, provost of Trinity-college in Dublin, to Dr. PLOT, dated at Dublin December 18, 1683<sup>2</sup>, giving an account of a weekly meeting there of several ingenious men about philosophical subjects, was read. It was as follows:

"I have received your letters of the 28th past, &c. and send something less than your minutes (seconds if you please) an abstract out of them, &c. Hereafter you may expect a more accurate account from the secretary Mr. WILLIAM MOLYNEUX (who is writing the Atlas for this country) nigh Ormond's Gate, in Dublin. And since you do so generously as well as charitably offer your assistance, I think this will be the best method of conveyance, to transmit our notices to the secretary of the Royal Society, who, after he has perused them, can send them to Oxford; as you likewise by him may send hither. After Christmas that we meet next, our secretary will pursue that course; you smoothing our way at London once again, as it seems you have already done. After a while we may perchance ease ourselves of that expence, and have our in-

<sup>1</sup> Letter-book, Vol. ix. p. 85.

<sup>2</sup> Ibid. p. 103.

teligence

telligence for nothing. However, you may be sure we shall never grudge to defray all manner of charges, that shall be incident to our correspondences; and we have raised a fund, of which to do it. By MOSES PIT, if not before, you may expect one or two of their discourses at large: For the way is for particular subjects mentioned the foregoing meeting, to be treated on by particular persons the next: And when they have done, every one, that has any thing to add or object, has his time and liberty to express himself. I don't give you the names of our Society, because you know few of them, except the Bishop of Ferns and Loughlin, Sir WILLIAM PETTY, and Dr. WILLUGHBY. And besides, you will receive it more authentic from the secretary. Several of the number meet at five upon Sunday nights (as the whole company does on Mondays) to discourse theologically, of God suppose, and his attributes, and how to establish religion, and confute atheism, by reason, evidence and demonstration: And when this work shall be well done (for all are not arguments, that some men call so) the way to the Scriptures and Christianity will be plain and easy; and the end is, that men might walk therein. Amen.

"After this particular narration, you must be pleased to give me leave to bespeak you more publicly; to present the thanks and acknowledgments of the persons afore-named, and all the gentlemen, who met here yesterday for the improvement of philosophical learning; and to assure you, and your whole Society at the Museum, that as they are very sensible of the honour you have been pleased to confer on them, by offering such an advantageous correspondence; so will they be ready to maintain it, according to the utmost of their ability, and glad upon every occasion to approve themselves your servants. This is but part of what I was commanded to say; and just enough to inform you, that you have a great many well-willers in Ireland, &c.

"After some previous meetings in tendency to the better regulation, settlement, and method of future transactions:

"October 15th, 1683, discoursed Mr. WILLIAM MOLYNEUX, *De apparente magnitudine solis, humilis et sublimis*: wherein declaring the matter of fact, and propounding the certain ways of trying it, he descended to the solutions hereof given by several great authors, particularly MENES DES CARTES, HORRELS, GARNERIOUS, and an Abbot in the Journal des Savans. And all these he found fault with, demonstrating their solutions to be dissatisfactory and erroneous. The Bishop of Ferns discoursed the *Radius reflexus et refractus*: wherein he shewed, after a succinct manner, the common appearances of refracting and reflecting, concaves and convexs, as their magnifying and diminishing object, their inversion and erection of the species. Also that the reflected and refracted rays together make a cylinder, if the glass be plain: but if concave or convex (*ex parte corpori luminoso obversa*) that then they make a cone, (only allowing for the refraction made within the glasses) yet with this difference, that when concave, the cone's vertex is towards the luminous body, and the basis avers; but when convex, 'tis quite contrary. And that, whereas if these two last are made use of as specula or perspicilla, their affections are quite opposite one

"one to the other: but if one be a speculum, and the other a perspicillum, they are all together agreeing. And this was shewn in three plain and easy figures. Mr. FOLEY explained Dr. BRIDGES's theory of vision, and confirmed it with some observations from anatomy. And Mr. ASHE gave an account of part of DE CHALES's book of motion.

"October 22, Mr. MOLYNEUX proceeded in his discourse, for confutation of the forementioned authors in the abovementioned appearance: And the Mr. WILLIAM KING offered to bring in a satisfactory solution thereof at the next meeting. Dr. LOFTUS discoursed concerning PIERRE SIMON's *Histoire Cœleste*; Dr. MOULIN *De Alkali et Acido*; and Mr. WALKINGTON concerning JACQUET's way of demonstrating ARCHIMEDES, with which he found fault.

"October 31, Mr. KING produced his solution of the phenomenon of the different bigness of the horizontal and meridional sun, and yet its subtending the same angle: But his account was not judged satisfactory. Mr. ASTON began his animadversions on HOBBS's *de Circ.* Mr. WALKINGTON proceeded with the former animadversions: as also took an occasion therefrom to discourse in the algebraical way of proceedings in demonstrations mathematical, removing the three grand objections, that HOBBS makes against it: but one thing not being very clear, he was desired to reassume it at the next meeting. The thing was how negative quantities multiplied on each other, as  $-A$  on  $-B$  should produce  $+AB$ ; and likewise how the roots  $A - B$  and  $B - A$  (though different magnitudes) have the same powers.

November 12. The Lord Bishop of Ferns produced a discourse concerning sounds and hearing, and comparing them in many respects to images and seeing, he offered many curious proposals for advancing one, as the other is advanced by optic glasses. Mr. WALKINGTON gave the company full satisfaction in the business last left upon him: but Mr. FOLEY raised an objection against the algebraical mathematics drawn from the 27th question of the 16th chapter of KERSEY's 1st book of algebra, p. 117. which Mr. WALKINGTON was desired to answer at his leisure.

November 19. Mr. MOLYNEUX explained the solution of concentric circles after JACQUET's method. Dr. MOULIN explained the fabric of the ear, and the bones belonging thereto. Mr. WALKINGTON discoursed of the objections against algebra raised by Mr. FOLEY.

"December 3. Upon occasion of some former discourse, Mr. Arch-deacon BAYNARD proved at large, that monarchy is the most natural government. Also Mr. ASHE gave an account of part of DE CHALES's book of motion.

"December 10. Mr. MOLYNEUX explained the phenomenon of double vision: viz. placing, suppose, two candles directly before you, one a foot, the other three feet distance from you, and looking steadfastly at the highest, the farthest seems double: also looking steadfastly at the farthest, the highest seems double: then

"Then winking alternately with one and the other eye : In the first case, the image corresponding to the shut eye vanishes ; that is, to the left eye shut, the left image of the farther duplicated object vanishes ; and to the right eye, the right image, viz. when looking at the farther object the nigher is duplicated, the image contrary to the shut eye vanishes : *i. e.* to the left eye shut, the right image of the nigher duplicated object vanishes ; and to the right eye shut, the left image vanishes.

"Dr. MOULIN prosecuted his account of the structure of the ear.

"Mr. FOLEY discoursed of the contagious communication of a strong imagination ; to explain and improve a notion of Monsr. MALEBRANCH'S, in his *Le reberche de la verité*, l. 2. part 3.

"The same gentleman has upon the loom a very fine piece, which he calls *Computatio universalis*, or *Logica rerum* : Being an essay attempting in a geometrical method, to demonstrate an universal standard ; whereby to judge of the intrinsic value of every thing in the world. But of this, and Sir WILLIAM PERRY'S new invention, when they shall think fit to communicate them. Only let me take notice to you of one lately found out by a gentleman in Ireland, viz. to hang a coach so, that notwithstanding the wheels of one side be never so high, or quite overturn, yet shall the body still hang in æquilibrium, and that the persons, that are therein, sit upright still, and be free from harm, &c."

Dr. PLOR was desired to acquaint Dr. HUNTINGTON, that the Royal Society very willingly embraced the correspondence of the Society at Dublin ; and had ordered their secretary to write to them in the manner proposed \*.

There were read certain observations of Dr. LISTER concerning the midland salt springs of Worcester, Staffordshire and Cheshire : Of the crude salt, which grows from the stone-powder dejected by the said brines in boiling : Of the specific difference between sea-salt and common salt : A way (which seems to be the true method of nature) of distilling sweet and fresh water from sea-water by the breath of sea-plants growing on it ; and that this breath probably is the material cause of the trade or tropic wind<sup>1</sup>.

Dr. LISTER then shewed the difference between the crystals of sea-salt and common salt. Those of sea-salt (which were viewed) had been evaporated from the sea-water taken up at Scarborough ; the other from a spring at Knareborough. The angles of the latter were all intire ; as likewise those of lixiviate marine salts, described by Dr. GREW. But the angles of sea-salt were cut into triangular plains, at least on one of the sides, as plainly appeared.

\* Mr. ASTON'S letter to Mr. MOLYNEUX, sent to the Dublin Society, dated Feb. 26. 1684, is inserted in the Letter-book, vol. ix. p. 101.

<sup>1</sup> These observations are entered in the Register, vol. vi. p. 27, and printed in the Philosoph. Trans. N<sup>o</sup> 156, p. 439, for Feb. 1683.

Concerning the breath of plants, there was read a passage in Dr. Plot's *Natural History of Oxfordshire* concerning one WILLS, who experimented how 13 ounces of water were breathed out by a sprig of mint in the time, that 10 ounces was evaporated by the sun.

Some plants were mentioned as remarkable for this breathing.

Dr. AGLIONBY observed the sensibleness of this breath in a green-house.

Mr. HOOKE shewed a way how to give the proportions of two weights **One** to another, the apparatus being not designed for an accurate trial.

Jan. 23, at a meeting of the COUNCIL were present,

Mr. HILL  
Dr. GREW  
Dr. AGLIONBY

Sir CYRIL WYCHE president  
Mr. FLAMSTEAD.  
Mr. HALLY  
Mr. ASTON.

It was ordered, that the treasurer pay Mr. HUNT's bill, being 20*l.* for half a year's salary due at Christmas.

Mr. HILL read a catalogue of such books, as Dr. TILLOTSON, dean of Canterbury, was willing to give the Society, if they would deliver up his bond : upon which it was ordered, that it be left to Mr. HILL to get what books he can of the dean, and then deliver up his bond, but keep the dean's name still in the list.

It was ordered, that the treasurer pay Mr. ASTON 40*l.* as a present for his services done the Society.

A proposal being made by Dr. LISTER, that if the council would order a press or two to be made after the fashion of those, which are already in the Museum, that it might suit them, with drawers, as he should give directions to the workmen, he would give his pains in reducing the minerals into such order and method, as might facilitate the understanding them, and also preserve them, that they might be readily had at any time for inspection, and other uses, that may happen : Upon which it was ordered, that Mr. HUNT should get one or more presses made according to the directions given him by Dr. LISTER.

Dr. GREW acquainted the council, that he had almost finished an index to the repository.

He was desired to give all help and assistance to Dr. LISTER in disposing the minerals.

<sup>1</sup> His account of this instrument is entered in the register, vol. vi. p. 138. and printed in his *Philos. Experiments*, &c. p. 121.

Some proposals having been read at the last meeting of the council, and referred to the next, were now read again, and concluded upon in the following manner:

1. That a duplicate be transcribed of the register-books and journal books, and that that it be kept distinct from them for the more security.
2. That a very particular index be made of the register, journal, and letter-books; and that in the said index be noted with an alteration what had been already published in the *Philosophical Transactions*.  
The method of the index was to be farther considered.
- Dr. AGLIOSBY and Mr. HILL proposed to make the index.
3. That the index be printed, if the council think fit.
4. That no mechanical experiment be brought in by the curator without a finished design upon paper, as used formerly to be done, well and circumstantially explained in writing; which shall be left with one of the secretaries to be entered in the register.
5. That whatever experiment is ordered by the Society to be tried, the order thereof being first drawn up, read, and approved of by the Society, shall be given to the curator in writing. And that the curator shall give an account in writing of the event, whatever it be, and deliver that paper to the secretary, subscribing his name to it.

At a meeting of the Society on the same day, Sir CYRIL WYCHE president in the chair.

Upon occasion of cast iron's being doubted to be magnetical, two pieces of soft metal sent by Dr. LISTER were found to draw round the needle of a compass:

As likewise another piece from Mr. AUBREY.

Upon occasion of under-currents, Mr. HOOKE mentioned an Italian book, lately written to this purpose about the Bosphorus of Thrace. Dr. AGLIOSBY was desired to take the trouble of perusing the book.

A letter of Dr. LISTER to Mr. ASTON was read concerning thunder and lightning being only from pyrites\*.

It contained, 1. Some instances of iron having been rained at several times; but no other metal... 2. An instance of lightning being magnetical, mentioned in the *Philosophical Transactions*, N<sup>o</sup>. 127. Which passage being read, it was queried, whether any one could object against the truth of the relation there set down: but nothing was said against the truth of it.

Mr. HOOKE remarked, that by striking a needle with a brass hammer, the pole might be changed from north to south. To which it was answered by Dr. WAL-

\* It is inserted in the letter-book, vol. 120. p. 83, and printed in the *Philos. Transactions*.

113, that there was nothing of hammering mentioned in this relation, but with more probability a new touch of a magnet.

However, Mr. HOOKE was ordered to shew at the next meeting, how the pole of a needle is altered by striking, that the applicableness to this case might the better appear.

Mr. HOOKE said, that he had found a sapphire electrical, though denied to be so by Dr. PLOT.

Dr. WALLIS remarked, that the individuals might differ, and some be electrical, though others were not so.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, January 20, 1681,\* was read, mentioning several distillations performed by himself and Dr. PLOT; as brimstone *per se*, brine from salt of tartar, brine from calx viva, brine from chalk, and brine from ashes. The product was a clear water, not brackish; which was reserved for farther experiments.

Mr. MUSGRAVE mentioned also a Latin MS. which he had met with at Leyden in 1680, by Dr. DE MAELS, in which, among other things, the author gave an account of the chemical analysis of the stone of the bladder, which, he observed, resolved itself by distillation into *portionem aliquam serosam, paucillam olei, cum salis volatilis urinose quantitate satis notabili*; and the *caput mortuum* is a mere terra.

Mr. HOOKE shewed the manner of a balance, in which the weight was not mixed, and which had a greater latitude than the common ones: and he shewed a pair of Japan scales†, which appeared to be not at all exact, and was said by Dr. WALLIS to have the point of suspension a great deal above the center of gravity.

Monf. MUNCKHAUSEN presented from two copies of a book of his *De herniis*, which Dr. AGLIONY was desired to peruse.

Mr. HAAK presented a book of ISRAEL CONRADUS *de frigoris Naturâ & Effectibus*.

Jan. 30, there was no meeting of the SOCIETY on account of the anniversary of the death of King CHARLES I.

Feb. 6, Sir CYRIL WYCHE president in the chair.

Mr. BOYLE presented to the Society a copy of his new book, intitled *Memoirs*

\* Letter-book, vol. ix. p. 87.

† His account of the balance and Japan scales

is entered in the register, vol. vi. p. 142. and printed in his *Philos. Experiments*, &c. p. 123.

Mr. HAAK presented to the Society an edition of the emperor JULIAN's *Cæsars*, published in France by Monsr. SPANHEIM.

Dr. HOLDER moved, that some of the seeds brought from Tunquin might be disposed of to curious persons, desiring to see and cultivate them: which was agreed to, provided that some few of every sort be left for a sample in the repository; and that the names of the persons, to whom the seeds should be distributed, were taken, that they might be inquired after.

Mr. HOOKE being called upon for the changing magnetical poles produced a drill\*, whereby the intention of the experiment appearing, it was not proceeded on; especially as he declared, that it related not to the instances of the magneticalness of lightning mentioned at the last meeting.

Dr. LISTER having mentioned, that brass is magnetical, promised to give an account of that assertion another time.

Dr. HOLDER shewed the draught of a piece of Mosaic work found in Sir EDWARD HUNTERFORD's lands near Bath, which Mr. HUNT was ordered to take a copy of for the Society.

Mr. PACET being said to have shewn, that the dipping needle follows the fire, was desired to shew the experiment at the next meeting.

Dr. AGLONBY having read over the book *De berniti*, declared, that there was a great deal of readings in it, but little experiment.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, February 2, 1684, was read, containing, among other things, several experiments about freezing; as that 2 inches of water in a tube of  $\frac{1}{2}$  inch diameter expanded itself upon freezing  $\frac{1}{2}$  higher; that a tube of 1 inch diameter filled 6 inches, rose upon freezing  $\frac{1}{2}$  of an inch: and that  $\frac{1}{2}$  a pint of water upon freezing lost in weight  $\frac{1}{8}$  gr. viii.

Dr. CROUNE said, that having weighed 3 ounces of water, he found it after freezing to differ a scruple and half.

Sir CHRISTOPHER WREN remarked, that if water were suddenly frozen, there would be less difference in weight.

Dr. CROUNE said, that he observed water, which he had put into a bolt-head, to rise higher before there was any thing of freezing in it.

\* His account of this is entered in the register, vol. vi. p. 165. and printed in his *Philos. Experiments and Observations*, p. 128.

Mr. HOOKE attributed the rising of the water in the neck of the bolt-head to the shrinking of the glass.

Dr. CROUNE said, that the glass had been long in the cold before, and that the water rose immediately.

Dr. WALLIS proposed, that an empty glass might be cooled well in freezing liquor, in order that it might have its contraction before the water be put into it.

This was done immediately by Mr. HUNT; and the water being put into a small bolt-head rose about of an  $\frac{1}{8}$  inch in the neck, though the air at that time was very warm.

Mr. HOOKE gave an account, that himself, Dr. AGLIONY, and Mr. MERRIVITH had made a trial of the strength of ice; and that a piece of ice  $3\frac{1}{2}$  inches thick, 4 inches broad, and having a foot clear between the places of bearing an iron-rod in the middle, bore 300 weight very well, but 350 being laid on, it broke after some time, this weight with the two beams making near 400 pounds.

Dr. CROUNE said, that a piece of ice like a coffee-dish bore about  $\frac{1}{4}$  of an ounce in water without sinking.

Mr. HOOKE said, that ice was  $\frac{1}{4}$  lighter than water.

Dr. LISTER took notice, that frost makes inanimate things flaccid, and animate stiff; the leaves of laurel hanging down probably from a stoppage of the pourishment.

Upon mentioning rustia, it was doubted, whether it were a mixture or mere orpiment.

Dr. LISTER observed, that it might easily be tried; for if it were orpiment, when it is burnt upon silver, it turns it.

February 13, Sir JOSEPH WILLIAMSON in the chair,

Mr. HUNT shewed the draught of the Mosaic floor, which was ordered to be hung up in the repository.

A book of Mr. DENIS concerning a strange fountain in Poland was presented from Mont. LUDOLFUS, to whom thanks were ordered to be returned by his nephew.

An extract of a letter for Mr. LEEWENHOEK, dated at Delft December 28,

\* This account is entered in the register, vol. vi. p. 146. and printed in Mr. Hooke's *Philos. Experiments and Observations*, p. 130.

1683<sup>b</sup> was read, containing some farther observations of the scales growing upon men as they do on fishes: of the scales on the middle of the lips: of a scaly child: also an examination of the slimy matter or woolly substance within the guts: and an experiment, that water passes through a bladder, when wine will not.

This experiment was not looked upon as new, though the truth of it was not doubted of.

Mr. Hooke made a trial of the different weights of ice and water<sup>c</sup>.

An extract of a letter of HENRY GYLES to Dr. LISTER<sup>d</sup> was read, concerning a strange sort of field-mice, which had done much mischief in Holderness for four months past, eating up the grass and corn; and that they had now spread themselves as far as Hull.

Mr. HAAK reported from a letter of Mr. CLUVERUS, that Monf. KERCKRINGIUS, resident at Hamburg for the Grand Duke, intended to publish a treatise *De Motu Muscularum Et Origine Nervorum*, in opposition to several received opinions *circa principia morbi in animalibus*.

The secretary was ordered to write to Monf. KERCKRINGIUS as being a member of the Society.

Dr. TYSON proposed Monf. PECKLINIUS, living about Hamburg also, as a correspondent.

Mr. HAAK observed, that Monf. BRAND, who made the phosphorus, affirmed, that he could make a liquor, that would keep flowers in their present hue and colour; but that each flower must have a peculiar matter.

A letter of Monf. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, February 9, 1681<sup>e</sup>, was read, mentioning, that pump-water expanded in freezing in a glass tube of an inch diameter from 6 inches to  $\frac{1}{2}$  of an inch more: and that pump-water boiled to  $\frac{1}{2}$ ; river-water but to  $\frac{1}{3}$ :

That lumps found in marl-pits in Staffordshire, and a stone in a boar's bladder after calcination, applied to a magnet:

That a sharp stone had been found between the *processus mamillares* of a hog:

And that Mr. MOLYNEUX had sent to the Philosophical Society some of the

<sup>a</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 160. p. 58<sup>e</sup>, for June 1684.  
<sup>b</sup> His account of these experiments is inserted in the register, vol. vi. p. 149. and printed 1721.

Mr. Hooke's *Philos. Expt. and Observ.* p. 134.

<sup>c</sup> Letter-books, vol. ix. p. 93.

<sup>d</sup> Ibid. p. 95.

Lough Neagh stone originally holly (for Lough Neagh turns nothing but holly into stone) and a black stone full of golden stars, and some Irish rock crystal.

Dr. LISTER conceived, that he had two sorts of these Lough Neagh stones, one from holly, and another from ash; one a lime-stone, and another an iron-stone. He added, that holly might turn suddenly by reason of its viscousness and tenacity.

Dr. LISTER shewed a piece of this stone in the Museum, which was stone, iron, and wood.

Mr. PAGET gave in a paper of experiments of the force of heat upon magnetic bodies, as follows<sup>f</sup>.

Day	Hour	Inclination	Attraction	Retraction
Feb. 04	12.m.	72° 5'	65	<p>" The south pole of the inclinatory needle was drawn with half a sheet of the lighted paper, as in the margin.</p>
05	10 p.m.	72 2	69 5'	<p>" The same pole with the flame of a candle applied to the ring.</p>
06	10 p.m.	72 2	68	76 <p>" With the flames of two half sheets of paper successively applied to the north and south sides of the same pole: and half an hour past twelve the same night I find it returned to 63.8</p>
08	11 p.m.	70 5	68 5	<p>" This experiment was tried as the former: but about half an hour past twelve changing the plain of the instrument to north-west and south-east (which in the former observations had continued in the plain of meridian) that so the needle coinciding with the horizontal axis, might restrain the force of the terrestrial attraction, I found, what I expected, that the south pole did comply much more with the influence of heat, as appears in the margin.</p>
09	15 a.m.	90	80	80 <p>" Having a mind to try, whether the heat would not have a contrary effect on the north pole, I placed the instrument in the meridian, and after that itself and the needle were settled, I</p>
12	01 a.m.	72	74	<p>" applied</p>

<sup>f</sup> Register, vol. vi. p. 40.

" applied two half sheets at the same time on each  
 " side of the instrument parallel to the southern  
 " chord of 60°, keeping the flames up to the north  
 " pole, and I found it to chase that pole in the  
 " same manner as the unfriendly poles of magnets  
 " use to do. I tried the same thing three or four  
 " times the same day, and still the north pole shun-  
 " ned the flame."

An inclinatory needle was hung up in the gallery, and it appeared, that the south pole of the needle followed the flame 5°, but the north pole shunned the flame.

Mr. PAGET was desired to prosecute his observations on this subject.

Feb. 20, Sir CYRIL WYCHE president in the chair.

A paper of Dr. LISTER was read concerning the rising and falling of the quicksilver in the barometer, and what may be gathered from its great rise in frosty weather as to a healthy or sickly season.

In this discourse a new opinion was offered for explaining some things in the barometer (besides the weight of the air) as, 1. why the quicksilver sometimes flutters, when it is fallen very low, as Mr. LISTER had observed. 2. why the quicksilver varies very little between the tropics. This was confirmed by Mr. HALLEY's observations, that in St. Helena in two months time, in diversity of weather, the quicksilver did not differ  $\frac{1}{2}$  of an inch, besides other instances at Barbados and Tangier. It was therefore supposed by Dr. LISTER, that the quicksilver is sometimes expanded, and then is in a natural state and high; sometimes contracted or squeezed together, as when it is low; this appearing by the concavity of its surface both in the tube and the box.

For the healthiness of cold weather was urged the great age of men in the mountains of England; the natural coldness of the blood of animals; for the species of birds and beasts are but about 300, in which the blood is warm. But the species of the fishes, wherein the blood is cold, are above three times the number; the species of insects almost innumerable; Mr. WILLUGHBY in one collection having had above 2000: That insects, when they are frozen, and flung against a glass, have been ready to break the glass, as if they were ice: and the same insects afterwards warmed, have crawled away.

Mr. HALLEY remarked, that he had found the blood of a sea-tortoise new killed as cold as water.

† It is registered vol. ii. p. 48. It is printed in the *Philos. Transactions* N°. 163. p. 790. for November 1664.

Dr. TYSON observed the blood of an hedge-hog to be so.

The plague was said to be natural in Asia, and consequently not bred here : the small-pox to be first mentioned by the Arabians 500 years since; and the new griping of the guts to be natural to India.

Dr. AGLIONBY supposed, that this last disease might be occasioned by the planting much fruit in England within the last twenty years.

Dr. LISTER remarked, that peaches and apricots were as plentiful in the North as in any place of England; and yet that this griping of the guts was not yet at all among the people there.

Dr. SLARE brought in an account of some trials made with sea-ice; brought from Harwich harbour as follows<sup>b</sup> :

“ When it was dissolved to water in the common thaw, we found it quite tasteless, for so it was, when ice.

“ By dropping several solutions of fixed salts upon it, there subsided nothing to the bottom, but it remained clear.

“ Nor did spirit of harts-horns or of sal armoniac disturb this liquor, or precipitate any thing out of it.

“ We dropt into the same sea-water acid spirits, particularly that of vitriol and of salt; but it made no alteration.

“ We dropt also some claret-wine into a wine glass of this water, which, according to a lately printed experiment, makes waters, that contain any proportion of salt in them, turbid; but it gave to this a bright red; much better than to a certain pump-water, which is very soft, for people wash with it; yet even this took a more dull or darker red.

“ A wash-ball did readily dissolve in this water, and felt very soft to the touch, and raised a froth like the best river-water.

“ A pint is now distilling, but being not perfectly dry, ’tis reserved to the next meeting. But since as follows :

“ There was found at the bottom of the retort, which was brought to the Society, so very thin a crust, of a whitish substance, which seemed uneasy to be weighed; distilled water itself, after repeated distillations, leaves behind it a substance as to quantity and quality much like to this.”

<sup>b</sup> Register, vol. vi. p. 102.

Dr. SLARE brought in likewise an account of a trial, which he had made of the experiment of Dr. CROUNE, that water expands itself in a glass before any part of it be frozen; as also some observations on the freezing of oil of olives and oil of anniseeds.

With regard to the freshness of sea-ice, Dr. AGLIORBY said, that some parts of the sea-water might be frozen, which are fresher than others, as in some places the bottom of the sea has been found fresh.

Mr. HOOKE remarked, that this was not general, but caused in some particular places by accident: that capt. KNOX being to go to the Indies, might make trial of it, if one of the engines, formerly invented by himself for taking up water at the bottom of the sea, were ordered to be made for the captain.

Dr. LISTER moved, that sea-water might be sent for; but observed, that wiches, if you take out of the bottom, are saltier than at the top; and if they stand, grow saltier and heavier.

Mr. HOOKE said, that the sea-ice being something thawed before we had it, the saltier part of the ice might be gone.

Dr. LISTER observed, that the freshness of ice was no new remark, since BORICHIVUS had affirmed salt-water frozen to be fresh to the taste.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, February 17, 1681<sup>1</sup>, was read, transmitting a discourse of Dr. NARCISSUS MARSH, Lord Bishop of Ferns and Leighlin in Ireland, being an introductory Essay to the Doctrine of Sounds, containing some proposals for the improvement of acoustics<sup>2</sup>, which had been presented to the Dublin Society, November 12, 1683. This discourse was referred to the next meeting.

An optical problem of WILLIAM MOLYNEUX, Esq; secretary to the Dublin Society, sent by Mr. MUSGRAVE to Mr. ASTON in a letter of February 9, 1681<sup>1</sup>, was also read, and referred to Mr. HALEY to be considered by him, and to give in a report of it at next meeting.

There was mentioned in Mr. MUSGRAVE's letter of February 17, 1681<sup>1</sup>, an observation communicated to him, that a good quantity of iron ore is contained in sea-coal, which appeared not only by its fusion in a hot forge-fire, and the cinder lying protuberant and round at the bottom of the fire, as metals, that have been in fusion, but by the cinders moving the needle more strongly than ordinary ones, when they are calcined.

Dr. VINCENT shewed a sort of golden talc, which Dr. LISTER had found

<sup>1</sup> Letter-book, vol. ix. p. 57.

<sup>2</sup> Ibid. p. 109.

It is printed in the *Philos.*

Transact. N<sup>o</sup>. 156. p. 472. for February 1681.

<sup>1</sup> Letter-book, vol. ix. p. 96.

in

in several parts of England; and that it is this, which gives the glittering to the ventorino, which is accidentally made and found in the bottom of the glass furnaces at Venice; some of this tale being in the stone used for making glass, and falling to the bottom of the vessel by reason of its weight.

Mr. HOOKE shewed some farther experiments concerning the phenomena of ice\*.

February 27, at a meeting of the COUNCIL were present,

Sir CYRIL WYCHE president

Dr. CROUNE  
Dr. AGLIONY  
Dr. GREW  
Dr. LISTER

Mr. HILL  
Mr. HALLEY  
Mr. ASTON.

The books in the secretary's keeping were viewed, and found to be as follow:

Five books of minutes bound in leather, taken by Mr. OLDENBURG, beginning December 5, 1660, and ending May 24, 1677.

Three stitch paper-books of minutes taken by Mr. HOOKE, beginning October 25, 1677, and ending February 23, 1682. Another bound book of Mr. HOOKE's minutes, about one fourth full, beginning March 2, 1682, and ending July 26, 1682.

One book of minutes current, taken mostly by Mr. ASTON, beginning October 25, 1682, and coming down to the last meeting, February 20, 1682.

It was resolved, that the minutes of Mr. HOOKE be written in books suiting with the rest.

Five books bound in leather, containing registers of experiments entered by Mr. OLDENBURG; in the last of which books are about five leaves entered since his death.

One more register-book current, begun by Mr. ASTON.

Seven books of letters bound in leather, entered by Mr. OLDENBURG.

One more letter-book bound in leather, entered by Mr. ASTON.

Another letter-book current, bound in leather.

One book of minutes of the councils.

Another of the minutes current.

Three books of originals of the register-books; two of them bound in paste-board, and the other ordered to be so.

Several bundles of letters sorted alphabetically.

Other bundles of papers, of which no account was taken.

Mr. WILLIAM MUSGRAVE was proposed a candidate, and allowed.

Mr. HALLEY was desired to bring in experiments at the meetings of the Society in the manner of a curator; and he was informed, that he should be considered for

\* There is no minute of this in the journal-book, vol. vii. p. 210—213. but Mr. HOOKE's account of these experiments is entered in the

register, vol. vi. p. 154. and printed in his *Philos. Experiments and Observations*, p. 138.

it, as others had been. He was desired to proceed first upon magnetism, which he promised to do.

At a meeting of the Society on the same day, Sir CYRIL W. <sup>265</sup> ~~W. C. H. P.~~ <sup>president</sup> was in the chair:

Dr. MAPLETOFT presented to the Society the picture of WILLIAM HARVEY, M.D. for which Mr. HILL was desired to return him their thanks.

Mr. HAAK presented the picture of professor STURMIUS.

These two pictures were ordered to be hung up in the Society's meeting-room.

Dr. AGLONBY having perused Mr. BOYLE's *Memoirs for a Natural History of Human Blood*, delivered in an account thereof in writing, which was read.

The secretary read *An Introductory Essay to the Doctrine of Sounds*, by the Lord Bishop of Ferns and Leighlin, member of the Dublin Society. It contained a curious comparison of the faculties of seeing and hearing, in their different ways, as direct, refracted, and reflected vision and hearing; and also the various improvements of each by instruments and other contrivances already made, or probably to be made; together with a proposal of three desiderata or problems in acoustics:

1. *Sonum intendere quousque vult; or sonum ad datum gradum intendere.*
2. *Sonum extendere quousque vult; or datum sonum ad datum distantiam extendere seu propagare.*
3. *Sonum transire ab extremo ad extremum, et non per medium.*

It was accompanied with a figure of a femiplane of an acoustic or physical sphere.

A paper of Dr. LISTER on magnetism was read, as follows:

"The magnetic philosophers agree upon this experiment, that if a drill be used in the boring of iron, it will acquire a vigorous polarity. This I have often observed, that if you take up any common drill used in a smith's shop, where we will suppose no load-stone to have ever been; that it will, applied to the needle, take the south end thereof, though the drill be held in any posture. Also a simple iron or steel of the same shape changes its poles as oft as it is inverted; the end downwards being ever the north pole, as is observed in all the iron bars of windows.

"This, I say, agrees with the doctrine of these philosophers, that nothing either gives or receives a magnetism, but what is in its own nature truly magnetic, and such is all iron only.

• Letter-book, Vol. ix. p. 140.

• But

" But it is said again, that if a drill be used in the boring of brass, it will have its north pole in like manner fixed and determined. This I never tried or observed; and because I am therefore uncertain what to think of it, I therefore recommend it to the Society to have it tried before them; whether brass, that is, the compounded metal of copper and lapis calaminaris (which is in part iron-stone) will affect the drill: again that it may be tried, if that succeed, whether also simple and pure copper will do the like. This I recommend to be done before them."

" I shall now say what I have tried. I ordered Mr. HUNT to provide a new drill; which he did: this drill was indifferent to either pole, but still the end downwards was the north pole: this north end, or drill end, which bites in the boring, we touched with the north pole of a magnet, which immediately gave it a south pole. I then caused Mr. HUNT to work this drill in the boring of iron, which he did soundly, until the end was very hot; and then having applied it to the needle, it still had its south polarity, rather more vigorous than altered or destroyed by drilling."

" Mr. HUNT then used the same drill in boring fine copper, long and much, till it was again well heated; but all to no purpose; for it still kept its south polarity, which the load-stone had given it."

" From these experiments I conclude, that the end on the bit of a drill is naturally a north pole, and that drilling or using it excites only the natural and inherent virtue; but gives it no new polarity; and that a south polarity cannot be given to the bit of a drill by boring."

" 2. That if a south pole be given to the bit of a drill by a magnetic touch, that even drilling cannot take it away, or change it to a north: which (if true) is a convincing argument, that drilling alone indifferently into any body (as was affirmed) gives no new magnetisms."

" 3. That if magnetic bodies, as iron and brass, (which is in some measure also a magnetic, as I shall some time shew) can affect no change upon a magnetically touched drill; much less can we expect, that glass or flint, or hard wood should do it: which I recommend again to farther trial, because Mr. HOOKE owned he could not make them succeed in private trials, accusing the too soft temper of the drill; and therefore he is desirous to order better (if it can be) to be made, that we may not break off in uncertainties, but have the experiments tried before us."

Dr. LISTER desired, that this experiment might be tried before the Society, because Mr. HOOKE conceived, that the softness of the temper of drills hindered it from succeeding in some private trials, which he had made.

A letter of Mr. BEAUMONT of Whiteley-hall near Wakefield in Yorkshire was read, mentioning, that the weather-glass upon Tuesday, February 5, 1682, on which day the thaw began, was a 10th under 28, which was lower than he had ever seen it.

In

# ROYAL SOCIETY OF LONDON.

501. J

In a letter from Mr. GALE of Kighly in Craven in Yorkshire to Dr. Lister  
it was observed, that the weather-glass had stood at  $\frac{1}{2}$  above than  
usual time during the frost till Monday, February 4, on which day it fell  
the next day it fell  $\frac{1}{2}$  more, and on the day after  $\frac{1}{2}$  more, so that it was  
 $\frac{1}{2}$  of the lowest line.

Mr. Hooke remarked, that before the wind, which began the 7th at night,  
the quicksilver fell lower than it had been in seven years before; and that the  
wheel-barometer almost made a full turn in less than three days.

Upon questioning what was the highest rise and lowest fall of the quicksilver  
here, Mr. HAINES said, that 28 and  $\frac{1}{2}$  was as low as had been ordinarily ob-  
served here, and 30 inches and 2 or  $\frac{1}{2}$ , as high.

Mr. HALLEY reported, that he had read over Mr. MOLYNEUX's optical pro-  
blem, which he approved of and thought, there were few now, that were not  
satisfied, that objects were seen with both eyes together, and not one alone.

The secretary was ordered to take a copy of this problem.

Dr. CROWE delivered in an account of his experiments made on the dilatation  
of water by cold before it becomes ice, which was read and ordered to be re-  
gistered as follows:

## EXPERIMENT 1st.

" I filled a strong bolt-head about half way up the stem with water, a day or  
" two before the great frost went off, marking the place where the water stood;  
" and placing it in the snow on my leads, while I went to put some salt to the  
" snow, I found it above the mark so soon, that I thought the mark had sunk  
" down, which I presently raised to the water, and as soon as ever I mixt  
" the salt with the snow, the water rose very fast, about 1; inch above it. I took  
" up then the glass and found the water all fluid still: it was again set down in  
" the salt and snow, but when I came about an hour after to view it, the ball was  
" broke, and the water turned to hard ice, both in the ball and stem.

## EXPERIMENT 2d.

" Upon mention of this experiment in the Society, Mr. Hooke objected,  
" that it was the contraction of the glass, that raised the water, and that likewise  
" a quantity of the water in pouring in stuck to the sides of the stem, which by  
" little and little falling helped to make the water rise in it; therefore first ano-  
" ther bolt-head was taken, and put empty into a frigorific mixture of salt and  
" ice (for now the frost and snow were just gone) that it might first shrink and  
" contract there as much as it could; likewise another bolt-head of the same time  
" was filled half way with water, and set in another vessel of the same mixture,  
" and when it had rose about two inches, and was thought near freezing, the

“infrigidated water was instantly poured into the first bolt-head to prevent another objection, that it might of itself have been so warm as to have relaxed again the empty glass when it was poured in; and also to cut off the other part of the former objection, that some part of the water poured in sliding after down the sides of the stem, might help to raise the water there, a long glass funnel was provided, that reached down to a mark set on the stem of the empty bolt-head, into which the water was to be poured: after all, the effect was, that the water began instantly to rise as before, and when it was got up about  $\frac{1}{2}$  of an inch, we took it out, to see if there were no ice, fearing it might have begun to freeze in the ball, but it was still all fluid.

## EXPERIMENT 3d.

“At the same time we put another very thin ball of glass with a long slender stem filled about three inches up the stem with tinged spirit of wine, and sealed into the same vessel of the frigorific mixture just by the former bolt-head, and all the while the water rose in this, the spirit of wine fell in that. We broke off the top of the stem, and the spirit continued falling as it did before when it was sealed. It is to be observed, this slender bolt-head with the spirit of wine had not been placed before in any frigorific to shrink it, and therefore if the glass had at all shrunk with cold, the spirit of wine must needs have risen.

## EXPERIMENT 4th.

“And lest it might be thought, that the spirit's warmth might keep the glass from shrinking in spite of the frigorific mixture, another just like it was filled to the same height with  $\varphi$ ; and instead of rising, it manifestly and suddenly fell the thickness of the packthread, which was tied about it for a mark, and its former protuberant surface was become hollow: and farther it would certainly have fallen (as Mr. BOYLE long since had seen) if the great relenting of the cold had not hindered it.”

Dr. CROUNE said, that the water continued to move in the neck of the glass four inches and a half, and never fell back again, as in the Florentine experiment; and that when it began to freeze, the ice shot from the sides of the glass.

Mr. HALLEY remarked, that the Florentine experiment might be true as made in a warmer season, the frigorific mixture being spent; and yet the glass being once shrunk here might not relax by reason of the sharpness of the frost.

Dr. CROUNE said, that the experiment was tried here in the frost and after the thaw: that the Florentine experiment did not contradict him, though he could not find that assertion to be true, that the water should fall below the place where it was at first.

The Society being sensible of their obligations to the Norfolk family, ordered, that the president, Sir JOSEPH WILLIAMSON, Sir ROBERT REDDING, Sir THEODORE

THEODORE DE VAUX, Mr. EVELYN, &c. should be desired to wait upon the present duke of Norfolk, Earl Marshal of England.

Mr. Hooke shewed the way, which he took to examine the limits of heat and cold, that water will indure in the guise of a liquor, beyond which degrees, if the heat were increased, it turned to the spirituous body of air, and both by a kind of instantaneous starting or fulmination; the one to a prodigious expansion of some hundred of times its watery guise; but not so powerful suffering condensation as well as air; the other only starting about an eighth or seventh part, but so powerful, as to induce no compressing from almost the strongest body. He examined then by weighing an iron ball in it, both when it was just freezing, and when it was just boiling; and by that he certainly found, that in the state of water it was capable but of one thirtieth part of its bulk to be extended; that is, that the same quantity of water boiling hot, and so ready to turn into the form of air, was but a one and thirtieth part lighter than the same bulk of water, when it was ready to turn to ice.

He then tried several magnetical experiments about the quenching of red-hot rods of steel.

March 5, Sir CYRIL WYCHE president in the chair.

Some magnetical experiments having been appointed to be tried by Mr. Hooke before the Society, the effect was as follows.

There were three drills made of steel, and well hardened, and then fitted with pulleys for drilling.

Each of these, before they were used, were examined by a small magnetical needle in a box, to see, whether by their hardening they had acquired a fixed magnetical virtue, but by often repeated trials they were found not to have any such virtue; but which end soever was downward attracted the south end of the needle, and the upper end always attracted the north.

Each of these drills were severally tried, one of them by drilling of brass; a second by drilling of copper; and a third by drilling of marble; in every one of which in the drilling the edged point of the drill was turned dipping towards the north.

These drills being afterwards examined by the same needle in the box, they were found not to have any sensible polarity more than they had before the drilling; but which end soever of any one of them was turned downward,

\* HENRY who succeeded his father HENRY, in his titles on the death of the latter January 11, 1661.

† There is no entry of these two sentences Vol. IV.

minutes of Mr. Hooke in the journal of February 27, 1661; but his account of them is registered in the registers. vol. vi. p. 154.

‡ Ibid. p. 92.

that

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that was found to attract the south end of the needle in the box, and to chase away the north; and which end forever was uppermost, had the contrary effect.

A letter\* of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, March 1, 1681<sup>1</sup>, was real, containing several queries concerning trees split with the frost: An observation, that the water of a frozen pump opened by salt is not found serviceable as at other times, and will not bear soap as before: An account of the effects of calcining some okers; and of some other things communicated to the Philosophical Societies at Oxford and Dublin.

This letter was accompanied with a copy of a report of the LORD BURGHLEY, Lord High Treasurer to Queen ELIZABETH, concerning the examination of Dr. JOHN DEE, about the altering of the Calendar<sup>2</sup>, taken from a manuscript of Dr. DEE in Corpus Christi-college at Oxford; together with the reflections of Mr. JOHN GREAVES upon that report<sup>3</sup>.

A letter of Mons. JUSTEL to Mr. ASTON, dated February 3, 1681<sup>4</sup>, was read, giving an account of the philosophical occurrences at Paris, and Mons. THEVENOT's opinion of ice being fresh above, and salt underneath.

Sir ROBERT SOUTHWELL gave in a paper communicated by Mr. EDWARD RANDOLPH concerning the effect of a thunder-clap on the compasses of a ship on the coast of New-England<sup>5</sup>: The north poles of several compasses were changed south, and always continued so. The north pole of one compass was turned west, but lost its virtue in some time after.

Sir ROBERT SOUTHWELL was desired to procure such particulars, as were to be had relating to that account.

March 12, Sir CYRIL WYCHE president in the chair.

The president gave an account, that himself and the other members deputed by the meeting of the Society of February 27, had been to wait upon the Duke of Norfolk in the Society's name: That the Duke had received them very kindly, and said some words to this effect, "That he was sorry, that his father had prevented him in presenting to them the Norfolk library, because he had taken from him the opportunity of doing it himself."

A letter from Sir ROBERT SOUTHWELL to Mr. ASTON, dated at London March 8, 1681<sup>6</sup>, concerning the information, which had been given at the last meeting, about several compasses in a ship having had their poles changed from north to south by a thunder storm.

\* Letter-book, Vol. ix. p. 131.

<sup>1</sup> See Philosophical Transactions, N<sup>o</sup> 165. p. 766. 767.

<sup>2</sup> Letter-book, vol. ix. p. 133. It is printed in the Philosoph. Transf. N<sup>o</sup> 257, for October 1699.

<sup>3</sup> Letter-book, vol. ix. p. 135. It is printed.

in the Philosoph. Transf. *ubi supra*, p. 356.

<sup>4</sup> Letter-book, vol. ix. p. 128.

<sup>5</sup> Ibid. p. 129. It is printed in the Philosoph.

Transf. N<sup>o</sup> 157. p. 520.

<sup>6</sup> Ibid. p. 139. It is printed in the Philosoph. Transf. N<sup>o</sup> 157. p. 521.

Mr.

Mr. HENSHAW queried, whether any use of gunpowder would change the potency of a needle; and said, that fire or sulphureous matter often fell with thunder.

It was also queried, whether pulvis fulminans would have any effect on the needle.

Mr. WILLIAM MUSGRAVE of Oxford having been approved of by the council, was proposed candidate by Mr. ASTON.

The secretary presented from Dr. LISTER two schemes of the sands and clays in England, as he had observed them several years before; together with an introductory discourse, recommending the use of a soil or mineral map, representing the principal soils, which are naturally found, and most obvious in several parts of the country.

In this discourse some reasons were offered, why sand might have formerly been the most exterior and general cover of that surface of the earth, from several places whereof it has been since washed away, and differently bedded, not only on the sea-shore and bars of rivers, but likewise in places under ground.

The characters of sand were represented by Dr. LISTER to be durability and hardness, as being composed of small transparent pebble, an unalterable substance by fire, as the Italian jario; which, he said, might be abundantly supplied from several parts of England.

The clays he supposed to be another more inward cover or coat of the terrestrial globe. This mixed with sand is usually called earth, tho' earth, as it is in the surface, has usually with it a mixture of the rotten parts of plants and animals.

Mr. HOOKE examined several drills, some of which had been long used in ships. The bit was a strong north pole; the shank of some drew indifferently both poles of a needle very weakly.

Mr. PAGET remarked, that he had a drill, the bit of which was a strong south pole.

March 19, Sir CYRIL WYCHE president in the chair.

Mr. MUSGRAVE was elected fellow.

Upon the mentioning in the minutes of Dr. LISTER's schemes of sands and clays, he remarked, that they were drawn up in a method, which he had proposed himself several years before; but that they were capable of farther improvement: That

<sup>1</sup> He was created Dr of physic by the university of Oxford, March 5. 1684. Wood Fasti Oxon. vol. ii. fol. 224.

<sup>2</sup> Printed in the Philosoph. Trans. N<sup>o</sup> 164. p. 730. It is inserted in the Register, vol. vi. p. 55.

they contained a general character, together with one or two notes or distinguishing marks for every particular.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, March 15, 1684\*, was read, mentioning *Alumen plumbum*, or salamander's wood to be separated from the earthy parts by calcining and powdering : That Dr. PLOT had sent his queries about the splitting of trees by the late frost into several countries : That it had been queried at the Philosophical Society at Oxford, whether any trees besides oaks had been split by that frost : And that great quantities of dead congers had been cast up by the sea at Dun-church wall along the coast of Kent during that frost, as had happened at the same place about eight years before, and on the Severn shore in Somersetshire twenty-six years before.

Dr. LISTER observed, that congers were often cast up dead in Lincolnshire, seldom seen alive, as being a high-sea fish, and therefore little eaten.

Mr. HOOKE remarked, that they were taken in pots off the Isle of Wight, and the Scilly islands.

Mr. HOOKE shewed how a piece of iron heated red-hot drew the south pole of a needle more strongly than if it were cool, and repelled the north pole : And that the end of a piece of iron quenched downwards was a strong north pole ; and quenched upwards a south pole.

Mr. PAGET declared, that he had some steel, which being cooled in the air drew more vigorously than if it had been quenched in water ; but being cooled in moist clay drew more than when cooled in the air.

As to the position of the iron to give it a polarity, he said, that iron cooled in the position of the dipping needle was more vigorous, than if it were held perpendicular or horizontal :

That iron cooled in the magnetical east and west had an absolutely indifferency to either pole, there remaining nothing but the magnetism of the iron, as to the length of it : as to the breadth, he could not say what there was : That he thought, that a piece of iron of a foot long, by heating and cooling differently the ends, might be made two north poles, one at each end.

He was desired to put down in writing what he had observed on this subject.

Upon the observing the attractiveness of hot iron, it was queried, whether the same thing might not be done with a wood coal ? But trial being made of it, it did not appear to be so.

These trials being made upon a needle horizontally placed, Mr. PAGET conceived that position alone not to be exact enough for magnetical experiments.

\* Letter-book, vol. ix. p. 148.

Upon.

Upon a query, whether iron red hot would retain the touch of a magnet ?

Dr. LISTER caused an iron to be heated red-hot, and then touched it with the north pole of a magnet : but the iron received no virtue from it. He then touched an iron growing cold, and it was a good south pole.

Mr. HOOKE declared, how he had taken half an iron ring, and quenched it perpendicularly with the ends downward ; and that the ends were two weak north poles, and the middle a weak south pole.

It being desired to know what effect gunpowder would have on a needle, there was a needle in its box placed on the floor, and shot upon with a small gun charged with powder ; but the needle was not altered in its polarity.

A needle was also placed so, as to receive the action of pulvis fulminans ; but could not be found afterwards.

Dr. LISTER remarked, that this experiment did not come to the point of altering a compass by lightning ; for though all sulphur, and consequently lightning, comes from pyrites, yet very few pyrites are loadstones, and lightning is mag-netical.

Sir JOHN HOSKYNs desired, that it might be inquired of Mr. HENSHAW, how he had said a loadstone might be roasted, and afterwards put into water, so as to omit a substance, whereby the water becomes black, and as it were full of hairs, the loadstone remaining afterwards effete, and of no virtue.

The experiments appointed for the next meeting were about drills ; a note whereof was delivered to Mr. HUNT to be put up in the repository.

The account drawn up by Mr. HOOKE of his magnetical experiments tried with several rods of steel without touching them on the loadstone, as exhibited at this and three preceding meetings of the Society, was as follows.

" I shewed the way I took to examine the limits of heat and cold, that water, " should indure in the guise of a liquor, beyond which degrees if the cold was " increased, it turned to the solid body of ice ; if the heat was increased, it turned " to the spirituous body of air, and both by a kind of instantaneous flaring, or " fulmination, the one to a prodigious expansion of some hundred of times its " watery guise, but not so powerful, suffering condensation as well as air, the other " only flaring about an 8th or 7th part, but so powerful as to indure no con- " pression from almost the strongest body. I examined then by weighing an iron " ball in it, both when it was just freezing, and when it was just boiling ; and " by that I certainly found, that in the state of water it was capable but of one " thirtieth part of its bulk to be extended ; that is, that the same quantity of " water boiling hot, and so ready to turn into the form of air, was but a one and "

"thirtieth part lighter than the same bulk of water when it was ready to turn to ice. After which I tried several magnetical experiments about the quenching of red hot rods of steel: as I did also March the 5th, 12th and 19th, the account of which follows:

"Magnetical experiments tried with several rods of steel without touching them on the loadstone.

"They were of three sorts, 1st, on rods heated; 2d, on rods quenched; 3d, on rods hammered.

"First, I found, that small rods of steel about  $\frac{1}{4}$  of an inch square, and six or eight inches long being heated red hot in a fire were much more receptive and communicative of the magnetical virtue of the earth than the same when cold; that is being held perpendicular, or rather in the true dipping posture, the magnetical virtue did more powerfully actuate a needle, the lower end attracting the south, and the upper end the north part of a magnetical needle applied near to either of them; and that the same rod red hot being inverted performed the same effect. And that the virtue continued of the same nature, though more weak, when they were grown cold.

"2. That a polarity acquired by hammering or drilling would be destroyed by a heating of the rod all over red hot; and when suffered to become cold, they retained the same indifferency without their former determined polarity.

"3. That heat abstracted from steel was not the cause of this effect, for that a red hot tobacco pipe heated and applied in the same manner had not such effect, nor burning wood coals, nor the flame of a candle applied very near.

"4. That I heated one of those rods red hot, after it had been touched by the magnet, and so had a strong polarity, which would be whilst red hot reduced to its natural indifferency, and the lower end would attract the south end of the needle, and the upper, the north; and this indifferency it did retain when cold, being suffered to cool leisurely.

"5. That I found the magnet did as powerfully attract and hold the rod when red hot as when cold.

"Secondly, I found, that these rods of steel being heated red hot, and then quenched in a perpendicular posture, or in the posture proper for the dipping needle, the lower end, which was the quenched end, would acquire a polarity, and attract the south end of the needle; but the other end of the rod seemed almost indifferent to either pole, when inverted and turned downwards; but the quenched end, though it were turned upwards, would attract the south end of the needle.

"Next I took a vessel full of water, the bottom of which was nothing but a thin piece of parchment: then I heated a rod of steel, and when glowing hot I run the upper end of it placed in the dipping posture through the parchment bottom into the water, and thereby hardened the upper end of the rod; then I applied a needle to it, and found, that the quenched end had acquired a polarity, and attracted the north end of the needle, whether it were held upwards or downwards, but the other end seemed to have acquired not near so much, but seemed

seemed almost indifferent, in attracting the south when held downwards, and the north when held upwards.

3. I heated one of these rods of steel glowing hot, and through the parchment now made the side of the vessel, I run it into the water directly pointing towards the east in a horizontal posture, to see whether the quenching of the end abstractedly considered, as sudden cooling, would give any polarity to it; but I found, that the quenched end had now no more virtue of polarity than the other end, but the rod remained indifferent in both its ends; that which was downwards attracted the south, that which was upwards attracted the north.

4. I heated the rod again glowing hot, and quenching it flat ways in the water as near as I could in the east and west posture; and examining the same by a needle, I found it had not acquired any fixed polarity at either end, but each of them remained indifferent.

4. I heated a rod of steel as before, glowing hot, and quenched it with an inclination in the plane of the meridian at right angles with the dipping line, and examining it by the needle I found, that neither the quenched end nor the other had acquired any fixed polarity, but remained indifferent as before.

Thirdly, I tried several rods of steel, which had been thoroughly heated, and then suffered it to cool leisurely, lying east and west, and having found them indifferent without polarity, I put one of them in the posture of the dipping needle pretty near the plane of the meridian: I hammered it at the upper end with a hammer, the lower end resting in a hole in an anvil: then examining with a needle, I found, that both its ends had acquired a pretty sensible polarity; the under end a north, and the upper end a south; but the upper end seemed somewhat the stronger.

2. I inverted the rod by turning the north end upwards and the south end downwards, and hammering it in this dipping posture a good while. I found, that it had acquired a quite contrary polarity to what it had before; that end, which was before the north end, being now the south, and the south end was now the north.

3. I took another rod of steel, which was indifferent, and having placed an anvil so, that the upper face of it reflected the north with an inclination pretty near the posture of the dipping needle, I laid the rod upon the same pretty near in the plain of the meridian, and then hammered the middle of the laid rod with a hammer for a good while, and examining the rod afterwards with a needle, I found the rod had acquired a polarity, the lower end a north, and the upper end a south.

4. I hammered another rod of steel at right angles to the former position, the ends thereof respecting the east and west; and I found after this hammering, that neither end had acquired any fixed polarity, but they both seemed to remain indifferent as before.

March 26, Sir CYRIL WYCHE president in the chair.

Upon mentioning in the minutes the splitting of trees, the president remarked, that

that he had been informed by the Lord Weymouth, that the splitting began at the root.

Mr. HENSHAW supposed, that the reason of that might be because the root contains a great deal of juice, which upon the freezing might cause the tree first to split.

Mr. PAYNE said, that at Croyden there ran many pails full of water from trees, that had been split with the frost.

Sir. ROBERT SOUTHWELL observed, that several of the trees, which had been split, grew together again, and closed so, that then the chinks and clefts were scarce discernible.

With respect to the water running out of the trees, Mr. HENSHAW said, that the moisture lying at the bottom of the tree might be pressed and forced out by the frost.

It was desired, that Mr. PAGET would try, whether he could make two north poles in a bar of steel.

Mr. HENSHAW queried, whether iron heated till it is red hot, and cooled in a right position, would not acquire a polarity, as well as when heated with fire.

He likewise, in answer to a query at the last meeting, observed, that to take away the virtue of a loadstone, it must be made red hot, and then quenched in water and vinegar.

A letter from WILLIAM MOLYNEUX, Esq; secretary to the society at Dublin, to Mr. ASTON, dated at Dublin March 15, 1684<sup>1</sup>, was read, accompanying the minutes of that Society from Feb. 10 to March 10, 1684<sup>1</sup>, in which several considerable subjects were handled, the particulars of some of which Mr. ASTON was ordered to desire to be communicated. The minutes were as follow :

" Mr. WILLIAM MOLYNEUX discoursed of telescopic sights, as adapted to astronomical and other instruments; wherein he shewed their convenience and manner of performance from the principles of dioptric, and also demonstrated their exactness, being chiefly induced thereto, because the ingenious Mr. HOOKE in his animalversations on HEVELIUS's ouranography, had omitted the chief objection HEVELIUS makes against these kind of sights, p. 296, of his first *Maab. Caelest.* wherein HEVELIUS imagines that the line of \* \* \* \* \* is no longer than between the eye and cross hairs; whereas 'tis plain, that 'tis as long as between the object glass and cross hairs.

" Mr. KING proposed some queries relating to the acceleration of descending weights and force of percussion, particularly a given weight A being in one

<sup>1</sup> Letter-book, vol. ix. p. 147.

<sup>1</sup> Ibid. p. 143.

<sup>1</sup> Scale,

scale, and a weight B being given, it is required to determine the high from whence B falling shall strike A. Discourse upon this took up the whole time of our meetings.

"February 18, 1681, Mr. BAYNARD began a discourse (which he designs to continue) concerning the instruction of youth for the universities. Ordered, that Sir WILLIAM PERRY bring in a scheme of experiments to be made with the magnet. Mr. PATTERSON is also to bring in at our next meeting his observations in the last dissection of the malefactor.

"February 25, 1681, The Bishop of Ferns produced a paper of queries relating to the loadstone; but not having finished them, his Lordship was desired to bring them complete at our next meeting.

"Dr. MULLEN produced the ear of a calf, in the drum of which he discovered some cavities not taken notice of by the anatomists of that part: he likewise explained how the malleus, incus and stapes by means of a small muscle braced the tympanum. Mr. PATTERSON gave an account of what he observed remarkable in the late dissected malefactor; the chief of which were a very firm cohesion between the diaphragm and all the upper convex side of the liver; the right spermatic vein arising out of the emulgent vein, and so likewise the left from the left emulgent vein: the latter is natural, the former unusual; an unusual depression in the inside of the skull. He could not discover Peyer's glands in the guts.

"March 3, 1681. The Bishop of Ferns proceeded in his queries relating to the magnet. Dr. MULLEN exposed some experiments about the magnet, which he was ordered to put in writing, that they may be registered. He also discoursed of some discoveries in the ear of a pullet, surmising, that it wants the incus and stapes; but that a muscle and the malleus performs their office: likewise, that there are two communications between the two ears, one over, the other under the brain; also, that on the outside of the ear there is a sort of valve to make the passage closer or wider. Mr. BULKLEY gave an account of some experiments made by him on venal and arterial blood; as also of some observations made on a clitted dog; likewise some experiments of percolation, all which are registered.

"March 10, 1681. A letter from Mr. ASTON, S. R. S. was read, which contained some experiments lately made before the Royal Society. Ordered, that the thanks of this Society be returned to him for the favour of his correspondence, and that he should be pleased to offer our humble service to the Royal Society, intreating their favour and good-will towards us. He is likewise desired to let us know in short the result of what was offered in explaining those two surprising phenomena of the mercurial barometer, viz. its little or no variation about the line, and the fluttering of the quicksilver at its lowest ebbs in stormy weather in England.

"A letter from Mr. MUSGRAVE was read, containing the minutes of the Oxford Society. Ordered, That the thanks of this Society be returned them for the favour of their correspondence : and that they be desired to transmit to us Dr. LISTER's compendious way of observing the barometer, if come to their hands. Ordered, that Dr. HUNTINGTON give an account of the porphyry pillars in Ægypt, that accordingly it may be transmitted to the Oxford Society. Mr. MOLYNEUX gave an account of the petrifying quality of Lough Neagh (which is registered) and was ordered to transmit it to the Oxford Society. It was asserted likewise, that the water of Lough Neagh cures the ulcers of the King's evil.

"A letter from Dr. PLOT to Dr. HUNTINGTON was read, wherein the Doctor is pleased to promise, that he will procure for this Society all the duplicates, that can be spared from among the rarities of the Royal Society's Repository and *Museum Asinolanum* at Oxford. Ordered, that the most humble thanks of this Society be returned to Dr. PLOT for his generous promise ; and that our grateful acknowledgments be returned to the said Society, for the favour they are pleased to shew us therein.

"Dr. MULLEN gave an account of some magnetical experiments he had lately made, which are registered. Mr. FOLEY gave an account of some experiments he had made on beans, in relation to their texture and vegetation, after Dr. GREW's method. This is registered. He likewise produced a pretty figure stone, found in the chapel yard of the college. And exposed a pot, wherein were seen the curious shootings of salt of vitriol into various regular figures, as triangular, quadrilateral and pentagonal.

"Mr. BULKLEY produced the honourable Mr. BOYLE's book of human blood, and read the heads of it, promising to try some of the experiments therein mentioned, and not yet tried.

"Mr. PATTERSON gave an account of some very observable in the body of a young man twenty years of age, who died of the stone in the bladder, and was opened by him. This was registered. The stone he took out of him was of an oval figure, three inches round, and above an inch and an half long ; half of it was of a white and spongy consistence, the other half of a red and more solid body. He was ordered to try some experiments on the stone, and report them. Some discourse passed concerning the keeping a diary of the weather, which was looked upon by Sir WILLIAM PETTY as very difficult to perform, so as to make it useful and instructive without a great apparatus of barometers, thermometers, hygrosopes, instruments for telling the point of the wind, the force of the wind, the quantity of rain that falls, the times of the sun's shining and being overcast. As to the common thermometers, of spirits and hygrosopes of oat beards, wooden planks, &c. hitherto invented ; it was objected, that they lose their quality by keeping ; and that they are not constant standards ; and if we have new ones every year, we can make no estimate of the weather by them, in relation to what was observed by others last year." With

With regard to Sir WILLIAM PETTY's experiments relating to land-carriage, he was said by Sir JOHN HOSKYNs to have lately made above twenty new models for ship-building.

As to waters curing the ulcers of the King's evil, Dr. LISTER said, that the ancients had scarce any medicines to cure that disease, wherein the pyrites was not one ingredient, which works upon an open ulcer by way of caustic.

With regard to the shooting of salt of vitriol into several regular figures, as triangular, quadrangular, and pentangular, Dr. LISTER distinguished the growing of salt and its crystallizing. The crystals were of determinate figures; but salts, according to their growth and age, will have several figured crystals, till they come to their full growth. This growth of salt is never under water, being washed off as fast as it grows.

Mr. Hooke said, that snow had a growth like a plant; that he had observed it in stems with branches and leaves like that of a trefoil.

Dr. GREW remarked, that snow had a resemblance of plants, as a mallow-flower, a spike of lavender, and several others; but he attributed that growing to the frost.

Mr. Hooke agreed, that it was not a vegetation, but an accretion.

Dr. LISTER presented to the Society a sponge-coral, hollow about a foot long, found 100 fathom under water, upon the coast of Norway, and taken up with the deep sea-line. It was at first as thick as his arm and soft, but now shrunk as it is.

As to the inconstancy of the standards of heat and moisture, as spirits, oat-beards, wooden planks, &c. the two last were looked upon as most alterable by time.

Mr. Hooke said, that osken-boards might continue an hundred years.

Sir JOHN HOSKYNs said, that by the sound of the string of a cross-bow, it might be known for forty years together, whether the air were altered.

Dr. LISTER remarked, that oak might probably have a life in it after an hundred years, because mushrooms grow on it, after it has been felled many years, all sorts of plants having their own mushrooms, he having formerly distinguished at least twenty seven species of them.

Mr. Hooke observed, that there had been some hundreds of species mentioned, and that there was no doubt of their having seed.

Dr. GREW said, that Dr. MERRET affirmed, that he had the seed of some mushrooms.

Mushrooms being mentioned to grow from poplar chopt, and from some Italian stones, the truth of this was much questioned.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, March 19, 1681<sup>a</sup>, was read, mentioning, that it had been queried at the philosophical Society there, in what sense the word *unalterableness*, used by Dr. LISTER in his characteristic of sand, is to be understood, since sand may be melted down into glass.

It was answered by Dr. LISTER, that sand is not naturally alterable as to the weather, because of its hardness above any other fossil in England: that an English pebble was as hard as porphyry, and as fit for grinding colours, if it were not too little: and that no tool will touch it but a wheel and emery.

Mr. MUSGRAVE's letter mentioned likewise, that Irish slate was not affected by the magnet after four hours calcination, but became a yellow oker, and would score like it: that it very much resembled the sediment found at the bottom of Astrop, Tunbridge, &c. waters commonly esteemed vitriolic: and that an infusion of this slate made with common water will turn galls to a faint reddish colour.

Dr. LISTER observed, that some slate would require twelve or twenty four hours before it were sufficiently calcined to make it apply to the magnet.

Upon mentioning the mistake committed by the Italians in making our glasses with flint, instead of tarso, Dr. LISTER remarked, that our flint is a lime-stone, and makes the glasses fly; and that there is no true flint in the Northern mountains of England, whatever had been said by Mr. WEBSTER to the contrary.

Sir JOHN HOSKYNs observed, that he had brought the cuogolo into England, which he found to be a white pebble.

The making of glass being farther discoursed of, Mr. HOOKE said, that manganese is iron ore.

Dr. LISTER said, that it is called magnesia from magnes, the load-stone: that any iron ore will do it: that it takes away the foulness of glass: that the Romans not knowing it, their glass and urns are therefore all of a different colour from our modern glass: and that it had been lately found on Mendip hills.

Mr. HOOKE remarked, that the Roman glass hath this colour by age, because the glass in old abbeys seemed to be of the same colour.

Dr. LISTER remarked, that that glass had been nealed.

<sup>a</sup> Letter-book, Vol. ix. p. 149.

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Mr. HINSHAW observed, that salts are used in glass only to flux it, and that if they are not afterwards separated, they cause a crazing.

Dr. LISTER mentioned, that jet for glass-painting is made of litharge and pebble.

Mr. HOOKE said, that it might be made by lead alone, but that it is very troublesome, running through all the pots.

The experiments were about changing the polarity of an iron by knocking the ends.

April 2, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs	Sir CYRIL WYCHE president
Sir ROBERT REDDING	Dr. CROUNE
Dr. BROWN	Mr. FLAMSTEAD
Dr. LISTER	Mr. HALLEY
	M <sup>r</sup> . ASTON.

It was ordered, that Mr. HOOKE be desired to put into writing a description of the weather-clock and all its parts; and that it be delivered to the secretary to be entered in the register-book:

That Mr. HOOKE give his directions and assistance to Mr. HUNE, to reduce into writing some of the first papers marked by the weather-clock, that thereby the Society might have a specimen of the weather-clock's performances before they proceed to the repairing it.

Mr. FLAMSTEAD desired, that the journal-book in 1682 might be altered as to some expressions reflecting upon him entered by Mr. HOOKE.

It was referred to another time.

It was ordered, that Mr. WICKS should before every meeting of the Society be ready to take out two or three of the books in the secretary's keeping, whereof the last journal should always be one, to be exposed in the room during the meeting: and that he take care of them so as to deliver them into the secretary's hands at every meeting is ended.

LEWIS VAN HAMMEN, M. D. of Dantzick was proposed by Dr. BROWN.

Upon a proposal made to the council, that Dr. DENIS PAPIN was willing to execute the office of a temporary curator, by bringing in at every meeting experiments during a whole year to end at that time twelve-months, and to assist the secretary, if it be required; it was ordered, that Dr. PAPIN should have thirty pounds per ann. paid him by the treasurer upon the foregoing considerations. At

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE president in the chair.

Dr. VINCENT observed, that beating an iron in the middle takes away the polarity of the ends. It was ordered to be tried immediately.

Upon mentioning the growing of salts in the air, Mr. HENSHAW queried, whether they did not take something nitrous out of the air.

Dr. LISTER said, that salts were sed as plants are, which grow upon the earth.

Mr. HOOKE mentioned the shooting of ice near a mixen, and urine on the side of a glass (filled with snow and salt) in hexangular figures.

Upon mentioning corals and the several sorts of them, Dr. LISTER said, that some trees or rocks of them in the West-Indies were so hard as to split a ship; particularly one, that accompanied the Lord VAUGHAN to Jamaica; the greatest part of the men of the ship being afterwards saved upon the same rock till they could be relieved.

Upon mentioning the seeds of mushrooms, it was said, that mushrooms upon trees might be the matrixes of insects, and not come from a seed of their own.

Mr. HOOKE thought, that they had seed; and it was instanced in the flex kind, which was formerly thought to be without seed.

Mr. HENSHAW said, that mushrooms were observed to grow most in places where sheep go, and on the borders of muck-heaps.

He remarked likewise, that star-slime is found where cattle go, as conceived to come from the females.

Dr. LISTER conceived, that star-slime is nothing but frogs dissolved and putrified in the air, being taken out of the water in the winter-time by the crows, and lost upon the ground; and he observed, that he had often found the bones of frogs in them.

He remarked, that fairy-circles were made by the moles running round after one another under-ground in a circle, at the time of their coupling, not unlike bucks going round the females in the time that they rut.

Mr. HOOKE observed, that he had seen such circles on chalky hills, where he thought there was not ground enough for the moles to hide themselves.

Upon mentioning the unalterableness of sand, Sir JOHN HOSKYNs said, that there was such a sort of durable sand-stone found on the mountains near Dartmouth of the same kind with the cuogolo.

Dr.

Dr. LISTER observed, that the Romans made use of that stone for door-poils, altars, and places exposed much to the weather: that the pyramids of Borough-bridge were of it, but were something channelled or washed with the water.

Upon mentioning the difference of glass-urns from modern glass, Mr. Hooke conceived, that they were altered by lying.

The urn given by Sir CHRISTOPHER WREN being called for and viewed, was found very smooth, but in some places had a bluish shining.

Mr. Hooke observed, that this was a sign of its readiness to scale: that he had formerly seen several scales, that came out of it: and that Sir CHRISTOPHER WREN thought, that the mark of the punctillion might be fallen off with the scurf.

Mr. HENSHAW said, that colours on glasses, like pigeons necks, were often caused by volatile salts.

Dr. LISTER thought, that the Romans might make their glasses in a different manner, so as not to shew the mark of the punctillion.

Dr. PAPIN mentioned, that at Maran a glass blown was often claspt at the other end with four irons, and so finished.

Dr. LISTER observed, that there was a man living at York a skilful in glass-painting, as any, in his opinion, had been in former ages.

A paper of queries concerning the splitting of trees, sent by Dr. PLOT to the Lord Viscount Weymouth, and his Lordship's answers to them, were read, and ordered to be registered; as follow:

1. "Whether other sorts of trees were split besides oaks?

Ans. "Elm and ash; Mr. LANGLEY's the minister of Tamworth's elms by his house; and POTTER a wheel-wright in Wigington, who had bought a considerable parcel of ash, and had felled some before the frost, affirms, that those, which were felled, as well as those standing, were many of them split.

2. "Whether any did split with a noise?

Ans. "In many places with great cracks, as in Bramcote wood Mr. WAINSTAFF's son coming through it was so affrighted, that he thought the trees were all falling, the noise of the cracks were so great.

3. "Whether the trees did split towards the same point of the compass.

Ans. "They split on all points of the compass, for in Drayton park and walks I saw several, that were split, some in two, some three, some four places in every quarter of the trees.

Register, vol. ii. p. 104.

4. " Whether the splitting were common in the trunk or in the boughs ?  
*Ans.* " In the trunk altogether ; not any bough split.

5. " Whether any ice be found since, in the vessels of wood ?  
*Ans.* " Not any I can hear of.

6. " Whether the trees split be any of them dead ?  
*Ans.* " That is not discernible, for all things look now as in the hard time of the frost ; but I verily believe they art not dead.

7. " Whether any of the trees split have closed since ?  
*Ans.* " Very much closed, and I believe the barks will cement again ; but never the tree itself.

8. " Whether they art split through or only on one side ?  
*Ans.* " They were many (as I have said before to the 3d query) on all sides, but whether through or not is uncertain, though it is believed the crack is to the heart.

9. " Whether the bark by splitting be loosened from the wood ?  
*Ans.* " Not the least.

10. " Whether the roots be any way affected as well as the body of the trees ?

*Ans.* " The great spruns of many trees, some are split as well as the trunk of the trees, and that of old trees, that are knotted and nurled, which was impossible to be cloven by wedges ; headed trees were split as well as clear timber trees ?

" Mr. ANTROBUS, schoolmaster of Tamworth, discoursing lately with an Hungarian, did question him, if it were usual in their country in hard frosts, to have the timber crack : he did affirm it to be usual, and that they all did close again, and that the timber was not the worse, but we credit not the last ; and now many are of opinion, that lagged trees have been occasioned by such cracks."

As to the closing of trees, which had been split, Dr. LISTER said, that ingrafting is a kind of splitting, after which the trees close again.

Mr. HOOKE observed, that a new circle of wood being added every year, the trees might be closed on the outside, however they were loose and open within.

Upon mentioning the lag-wind shake and quag-shake, Sir ANTHONY DEAN said, that it happens to trees growing in a light ground, and not a clayey, stiff ground, from the shaking them when they are little : that the timber of them is never good ; and as soon as the air takes it, falls in pieces : that such trees, though of fair shew, are discernible to experienced men by the bark.

With

With regard to the decaying of timber, he said, that the but-end of a tree decayed in half the time, that the top does; the reason of which he thought to be, that the vessels in the bottom of the tree being of like number as in the top, those in the bottom are larger and more full of moisture, which being with the top, moist air comes in the place of it, and causes the timber to rot: and that upon this account the bread-room of a ship being very hot, decays sooner than any other part of it.

He mentioned also, that a slit deal lying in pitch and tar for two years grew so hard, as not to be cut by a chizzel, when the same sort of deal, that was exposed to the air, was all rotten.

Mr. HOOKE thought, that the trunk being the older part might die before the top.

Dr. LISTER judged, that the decay of timber was principally caused by the worms; and that charcoal was not apt to decay, because it was not a food for them.

Mr. HOOKE thought, that the proper menstruum, which decays it, was taken away, and that therefore it lasted.

Dr. PAPIN presented a book of Signor MONTANARI printed in 1682, and intitled, *Il manuelletto di bombisti*.

The experiments were concerning the taking away the polarity of iron by knocking in the middle; which did not succeed.

April 9. Sir CYRIL WYCHE president in the chair.

Upon mentioning the matrixes of insects breeding in plants, it was queried, what was the efficient cause of these matrixes, whether the mother insect, the eggs, or the worm.

Upon mentioning fairy-circles, Dr. LISTER said, that he had observed, that whenever a mole went, the grass growing over it was ranker than in other places; but this is not to be understood the first year, for then the grass is destroyed; but the second year, when the ground is fallen in.

Upon mentioning the splitting of trees, Dr. WALLIS remarked, that the vines had split from the bottom to the top since the frost, upon the coming in of the warm weather: and that they did not bleed, though the splitting reached often beyond the heart.

Mr. HENSHAW observed, that it was in old stocks chiefly, that the ever-greens, figs, rosemary, and cyress, were generally destroyed: but that broad laurel was not damaged: that the preceding winter was like that in Denmark, where the rosemaries are all destroyed, if they be not houghed.

Dr. AGLIONBY said, that the trees standing to the south had fared worse than those to the north : and that the sun had done the greatest damage.

Dr. WALLIS confirmed it, that the vines were split on the side towards the sun : but that vines standing to the north were not split.

Upon mentioning the hardening of deal by lying in pitch and tar, Mr. HENSHAW said, that probably the same thing might be done sooner by heating and rubbing it in.

Mr. HOOKE remarked, that turpentine in knots was one cause of making them hard ; and that white deal, soaked in turpentine, becomes very hard.

Dr. PAPIN mentioned, that he had made turpentine go through plaister of Paris by the compressing engine : and that the plaister was transparent, but not hard.

The experiment ordered to be shewn at the next meeting was concerning the generation of insects. It was said, that it seemed improbable, that it should be univocal and equivocal both. Mr. HENSHAW instanced in several generations seeming equivocal, as a sort of lice unlike the common sorts found in a corps ; worms found in several parts of the body, and the stomach and guts, which seem too hot for a natural generation.

Dr. LISTER thought the stomach and guts but moderately hot compared with other parts ; and that they might be reckoned as an outside of the body.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, March 27, 1684<sup>6</sup>, was read, giving thanks for his election. It was ordered, that he should have leave till the latter end of the year to come for his admission.

In this letter he mentioned, that their young Society at Oxford had of late passed several orders tending to the regulating of their proceedings, and making themselves a lasting body..

It was queried, on occasion of a passage of this letter, whether muckamby (or tithymal) purges, outwardly applied,

The Bishop of Cork said, that he had caused it to be carried in a servant's pocket, and that it had no such effect.

Sir JOHN HOSKENS doubted, whether it might not be necessary to have an immediate contact.

Monf. JUSTEL remarked, that antimonium diaphoreticum dissolved in water gave five or six stools to the person, who washed his hands in it.

<sup>6</sup> Letter-book, vol. ix. p. 150.

A French

1684.]

# ROYAL SOCIETY OF LONDON.

A French leathern heel of a shoe being mentioned in Mr. MASON's letter as petrified, it was doubted, whether it were not a real stone. Dr. ALLIS observed, that he had seen it, and that it seemed a petrification: that it consisted of two pieces, then shavings, afterwards other pieces, and hoies at the bottom, where pegs were put in: and he promised, that at his return to Oxford, he would get it bored.

Dr. AGLLONBY mentioned, that the Tunbridge wells did not spring in their usual place since the late great frost; but that it was hoped they would be found by digging.

An account of Lough Neagh in Ireland, and its petrifying qualities, by WILLIAM MOLYNEUX, Esq; secretary to the Dublin Society, was read.

It being asserted in that account, that one part of the wood was never stone, and another iron, Dr. LISTER thought, that the contrary appeared from a piece in the Society's repository: And it being doubted, whether the rusty part of that stone was iron, it was ordered, that a little piece should be broken off, and examined.

Dr. LISTER observed, that near the wells at Knareborough wood was turned into an iron-stone: that he had two pieces sent him from a gentleman at Sir GEORGE RAWDY's, as from Lough Neagh, one ash, the other holly, which was pyrites, and magnetical, though the like had not been observed by Mr. MOLYNEUX. And with regard to petrifications made in the sand near the Lough, he thought them very probable from the steams arising from the earth.

He also remarked, that copperas might be turned into a golden pyrites: of which the Society desired the trial at their next meeting.

Dr. LISTER presented to the Society his two exercitations *De fontibus medicatis Argæ.*

Sir ROBERT SOUTHWELL presented a small bottle of liquor from a tree, as was said by Mr. RANDOLPH, who brought it from Boston in New-England. The Indians used it for the curing of wounds, and found relief by it. It seemed to be a sort of turpentine.

Mr. HOOKE brought in a short description of the weather-clock, to which he was desired to add the figures of such parts, as could not be well understood by the words, and to put down the key for expounding the papers marked by the engine.

Dr. PAPIN shewed an alteration or improvement, which he had made of

<sup>a</sup> Letter-book, vol. ix. p. 151. It is printed in the *Philos. Transact.* N<sup>o</sup>. 158. p. 551. for April 1684.

his pneumatic engine, by placing two valves instead of a turn-cock, for letting the air out of the receiver into the pump, and from the pump into the open air.

He also shewed the experiment how the air driving some water into an exhausted bolt-head makes it represent a cylinder lying athwart the bolt-head\*.

This appeared so in an oval head, and not in a round one.

*April 16,* at a meeting of the COUNCIL were present,

	Sir CYRIL WYCHE president
Sir JOHN HOSKYNE	Dr. AGLIONBY
Sir ROBERT REDDING	Dr. BROWN
Mr. HILL	Dr. TYSON
Mr. HENSHAW	Mr. ASTON.

It was ordered, that Mr. HOOKER be paid seven pounds ten shillings for the experiments brought in by him as curator till Christmas last.

That he bring in a written account of the experiments made by him since Christmas; and that then the council would order his payment accordingly: and That the remainder of the money due for Mr. COLLINS's books be paid by the treasurer.

MONS. MUNICKHAUSEN was proposed by Dr. BROWN, and Mr. MONSON by Dr. TYSON.

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE president in the chair.

Upon mentioning the splitting of old vines, Dr. AGLIONBY remarked, that the old vines were not yet budded, but the young ones were.

Sir ROBERT SOUTHWELL said, that he had been informed, that in a quarry of stone the cold had pierced five yards deep from the surface.

Dr. LISTER remarked, that in quarries cold went down by the seams.

Mr. HENSHAW observed, that in mines the rain sunk down in holes; but that the gravemakers in new ground never found the cold above four or 5 feet in Denmark.

A French gentleman being admitted to be present said, that an engine for drawing water had been frozen this year at la Fleische in France, which had not happened since 1603.

In speaking of magnetism, Mr. HENSHAW queried, why an iron bar or anchor hanging at a loadstone for many days acquired no fixt polarity: but if the

\* Register, vol. vi. p. 170.

load-stone

load-stone be stroked on the iron, the latter acquires that property  
 commended to be again observed.

Dr. PAPI'S account of an examination of a piece of the iron broken off from  
 the petrified wood in Lough Neagh was read, as follows.

"Having been commanded by the Society to make some experiments upon  
 the petrified wood, which bark looks like iron ore, and to calcine  
 the wood, and some part of the bark, for to try whether any  
 be wrought upon by the load-stone; I did, according to some part of  
 break off some part of the bark, which was done very easily to them order,  
 came to break the wood, I found it much harder, so that being forced to give  
 a great blow, I broke more than I had a mind to. Having thus forced to give  
 difference, as for hardness, between the bark, and the wood, I found some  
 try also, whether they would differ as for specific gravity: and was willing to  
 pose, I went to Mr. BOYLE, but he being in the country, I was found some  
 with scales good enough, for such an experiment; and instead of that pur-  
 good load-stone, and saw, that it did no effect upon the bark, for that pur-  
 cined: then having put part of it into the fire, I took it off before it was provided  
 hot, and we found it already calcined: this being cooled, it was found, that red  
 good load-stone would work very much upon the powder of the bark; and a  
 little upon the powder of the wood.

"The next day I went to Dr. KING, who would try the same thing by ano-  
 ther way: having reduced thirteen grains of the uncalcined bark to a fine  
 powder, we did mingle it with near two ounces of water, and some powder of  
 galls being put in that mixture, we did not see, that it did effect any change of  
 colour therein. Then we made the same experiment with only three grains of  
 iron rust, and we saw, that the powder of galls did somewhat alter the colour  
 of the mixture: and the reason of it, according to the doctor's opinion, was,  
 that the body of the iron being opened by the rust, its vitriolic parts may be  
 wrought upon by the galls, from whence he concluded, that our petrified bark  
 looking rusty, should contain very little of iron, since the galls did no effect up-  
 on it. On this occasion, the said Dr. KING shewed me another experiment,  
 which I hope the Royal Society will not be displeased to hear of: for to prove,  
 that the rust is not the best way for opening the body of iron or steel, as some  
 people do believe, he had several preparations of steel, both liquid and solid,  
 of his own making, that did all of them much more effect than iron rust,  
 doth: and there was a powder amongst the rest, which being mingled with near  
 two ounces of water, and galls, would give a visible solution, although the  
 said powder did not weigh above the twelfth part of a grain: so that we did  
 reckon, that such a powder could effect more, than thirty times as much of the  
 iron rust. I can say no more of this, but that the wood is a great deal harder  
 to be calcined, than the bark is, and I have brought some of each, reduced to  
 a powder by the fire."

Dr. PAPIE had not let the iron calcine half an hour, which Dr. LISTER supposed might probably be too little for such a work. Nevertheless it appeared, that the calcined body applied to the magnet, as well as filings.

Dr. LISTER produced a letter, which had been written by Mr. THOMAS MACHELL of Kirkby-thore in Westmoreland to Sir WILLIAM DUGDALE, dated March 25, 1684, concerning some antiquities lately found there; as some old earthen vessels with pieces of urns, one piece of a drinking-glass, and several sorts of fandals. The figures of all these were carefully delineated, together with the inscriptions. There was also a piece of a broken vessel shewn, of a reddish colour; the relief upon it being greyhounds in pursuit of stags.

Dr. LISTER observed three sorts of materials used for urns in the North country. 1. A red fine earth like a bolus. 2. A blue clay mixt with coarse sand. 3. A blue clay with finer sand and mica: specimens of which were shewn.

He observed, that one inscription in the margin might be *Paulini*, probably the potter's name, being the same, which he had found upon other pots. This conjecture was confirmed by Mr. RICHARD WALLER from a book written at Nimeguen by SMETIUS on the antiquities of that place.

Dr. VINCENT mentioned the head of an urn inscribed *Ricinus F. for fecit*. Sir JOHN HOSKYNs took notice of another with *Satur F.*

Dr. LISTER said, that the blue urns must be baked in a pot, since the open fire makes them presently turn red; and that leading pots is a modern invention.

An extract of a letter of Dr. WOOD to Sir PETER PETT was read concerning Sir WILLIAM PETTY's late model of ships; which extract was as follows:

"Sir WILLIAM PETTY hath discovered a new \* \* of shipping; which will as much transcend the old, as guns did outgo bows. If we consider the strength (in every vessel) the burden, ballast, draught of water, sailing, steering, keeping to a wind, and as many more properties of a good ship, his excels the best the world has yet produced in all these, and yet after all, the cost and charge shall be considerably less. But to give a particular instance, let us take for example one of the best sailing vessels of England, of the old built, viz. the Constant Warwick or Fubbs Yacht, and another of Sir WILLIAM's new ones of equal draught of water and strength, but double the cost: call the former Fubbs and the last Buny, and comparing them together as to farther qualifications, I say Buny shall carry four times the burden that Fubbs can, ballast included, and bear sail in proportion as three to two; or thus, a common single body being given, suppose of seventy tons neat burthen, with thirty tons of ballast, we offer to make a double body, which needs no ballast, viz. carrying as much sail light, as the other loaden of the same or more neat burden,

\* It is printed in the *Philos. Transact.* N<sup>o</sup>. 158. p. 555. for April 1684.  
 † Letter book, vol. ix. p. 194.

" but

"but its draught of water shall be as four to seven, and the cost as eleven to eleven, 287  
 "and shall bear fail as eleven to seven."

"N. B. Demonstrated upon great variety of bodies, at least twenty vessels by  
 "him built here."

Dr. Lister having no present convenience of turning copperas into the gold-  
 en pyrites, as had been appointed at the last meeting, delivered in the following  
 method for doing it.

"Take vitriol grown green upon the pyrites, and not crystallized; wash it off  
 "with a little fair water. Take the strongest lye of the soap-boilers, which is  
 "made of quick-lime and pot-ashes: drop this latter upon the dissolved  
 "former, and the precipitation will fall in gilt particles like the pyrites.  
 "N. B. that the experiment will not succeed well, if the lye be weak of lime,  
 "of chalk, and common vitriol made with iron."

Dr. Lister produced the way of making an excellent cement, as it is used at  
 York, for cisterns and other conservatories of water, which being read, was oc-  
 dered to be registered as follows:

"First of all the bricks you make your cistern of must be choice, and clear  
 "from marl or salt; they must be rubbed even with sharp sand upon an even  
 "flat stone without water. And when they are wrought in the cement, they must  
 "be well dipt in water (immediately before they be set:) it is also requisite they  
 "be as new as possible from the kiln after they are burnt."

"Your old tile scares would also be burnt anew red hot, then beat small, and  
 "put through a very fine riddle: as also your lime the same, which must also be  
 "new from the kiln, and so sifted after it is quenched."

"The making of the cement is thus. That, wherewithal you set your bricks,  
 "must be three parts of new lime, and two parts of tile-duft; and that, which you  
 "coat your bricks withal, must be two parts of lime and two parts of tile-duft.  
 "Let it be tempered like common mortar with good store of elbow grease; and  
 "temper no more at a time than you use; for after two or three days it loses of  
 "its strength. Though to let it lie half a day or a night after it is tempered is not  
 "amiss. After your cistern is coted, for a week after, you must every day  
 "twice or thrice with linen cloths wipe away the sweat from the cement, till  
 "you find it has done sweating. Good bricks set well with the coating cement,  
 "and jointed smooth, will need no coating; but then the walls of your cistern had  
 "need be twice as thick as when you coat them."

"One rood of wall of a brick a length thick will require ten bushels of this  
 "cement."

Dr. VINCENT presented for the repository the following particulars; calcum aureum; belliculus; a stæchas flower gathered ten years before in Turkey; and the horns of a cervus volans.

The president gave in an extract of a letter from Liege, dated there April 9, 1684<sup>a</sup>, giving an account, that on the 7<sup>th</sup> February preceding some colliers at Herfot near Liege, by the accidental gushing out of waters in the pit, were hindered from going out for twenty-five days; at the end of which time four of them were yet alive, who had received no sustenance but from the water of a small spring, which rose hard by. The water of it upon evaporation left only a small calx like common water. A further account of the particulars was desired.

A paper from Mons. JUSTEL<sup>1</sup> was read, giving an account of a new barometer made at Roan in France, having no communication with the air but what must be through the wood; and yet having all the motions of the ordinary barometer. It was said to be portable in a coach and otherwise.

Dr. PAPIN shewed the way of making plaister of Paris transparent, by sinking turpentine through it: but the experiment, by some accident in the making had not all its perfection. His account of the method of doing this was as follows<sup>2</sup>:

“To the pneumatic engine I do apply a pipe, open at both ends, and having shut the upper part of it with a piece of plaister, I lay turpentine all over the same: then I overwhelm a broader pipe about the first, and pouring very hot oil into this last pipe, the turpentine laid over the plaister is melted, and penetrating into the same, makes it transparent; but no harder than before. Methinks, that by the help of the pressure of the air, pitch, or rosin, might be thus driven into all the pores of wood, to keep it from rotting, or worm eating: and several other materials might by the same way get some new properties: but how far the thing may be improved, I refer to the judgment of the Royal Society.”

Mons. MUNICKHAUSEN was proposed candidate by Dr. BROWN.

Mr. FLAMSTEAD communicated a letter to himself from Mr. HEATHCOTE, dated from Cabo Corfe Castle on the coast of Guinea, December 14, 1683, concerning the tide on that coast; variation of the needle, &c.<sup>3</sup> According to this letter, the tide runs there continually eastward, except at full and change; and flows about six feet. The variation was 3 degrees 49 minutes to the westward. The barometer was found at 29 inches, and in a tornado 29  $\frac{1}{10}$  inches.

At a meeting of the COUNCIL were present,

<sup>a</sup> It is printed in the Philosoph. Trans. N<sup>o</sup> 158. p. 577.

<sup>1</sup> Letter-book, Vol. ix. p. 195.

<sup>2</sup> Register, vol. vi. p. 176.

<sup>3</sup> Letter-book, vol. ix. p. 156. An extract of this letter is printed in the Philosoph. Trans. N<sup>o</sup> 158. p. 578. for April 1684.

## ROYAL SOCIETY OF LONDON -

Sir JOHN HOSKYNs  
Sir ROBERT REDDING  
Mr. MEREDITH

Sir CYRIL WYCHE president  
Mr. HILL  
Mr. FLAMSTEAD  
Mr. ASTON.

It was ordered, that the treasurer pay ten pounds to Mr. HOOKE for experiments brought in between Christmas and Lady-day last

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE in full for his in the chair.

A letter from Mr. EVELYN to Mr. ASTON, dated at Say 14 April 1684<sup>o</sup>, was read, concerning the damage done to his Court, Depesford, Gardens there by the preceding winter.

The secretary was ordered to return the Society thanks to Mr. EVELYN, and to desire, that this letter might be printed, there being many curious remarks in it, by which the public might be instructed and receive benefit at that time.

It was also proposed, that there might be mentioned to him the finishing of his *Elysum, or Pandæti*, a book very much desired.

A letter of Mr. JOHN DAVIS, minister of Little Leak, in Nottinghamshire, to Mr. ASTON, dated there April 1684<sup>o</sup>, was read concerning a weaving engine invented by himself, by which he had woven the pattern inclosed in his letter. It mentioned likewise others of his contrivances of musical instruments, and lamps not spoken of by Mr. HOOKE; a method of making a balance clock go longer than spoken without altering the inward work; a sort of pump fit for ships, no bigger than usual engines used for quenching of fires, but raising a great deal of water. The woven pattern sent by him seemed to be loom knit like a stocking.

The Secretary was desired to return an answer, and to know, whether Mr. DAVIS would think fit to communicate his method of raising water, and new lamps.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, April 19, 1684<sup>o</sup>, was read, concerning the splitting of trees by the late hard frost, and a piece of black British marble spotted white, used by Mr. WOODAN of Bolton in Pembrokeshire as a limestone.

Mr. BAILEY having delivered in an account of the tides at Tonquin, procured from persons, who had lived long in the place; it was ordered to be registered.

<sup>a</sup> Letter-book, vol. ix. p. 158. It is printed in the Philosoph. Trans. N<sup>o</sup> 158, p. 159.

<sup>b</sup> Letter-book, vol. ix. p. 165.

<sup>c</sup> Ibid. p. 167.

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<sup>d</sup> It does not appear in the Register. A letter of Mr. FRANCIS DAVENPORT, dated July 17, 1678, on this subject, is printed in the Philosoph. Trans. N<sup>o</sup> 162, p. 677, for Aug. 1684.

It was very remarkable, that there was at Tonquin but one flood and ebb in twenty-four hours; and, as Mr. HOOKE observed, that when the moon is in the north of the æquator, the floods begin in the morning: When she is in the south side of the æquator, they begin in the afternoon.

Mr. HOOKE remarked likewise, that Captain KNOX had made several observations confirming the truth of this account, as would appear from his journal in the hands of the Earl of CLARENDON, if it were consulted.

Mr. HUNT presented from one Mr. BAGFORD living in Holbourn,

1. A piece of cabbage stalk from Northamptonshire, being perfect wood, and having a grain like box.
2. A Derbyshire wooden calendar.
3. A piece of jasper dug up in the gravel pits at Islington, seeming to have been the handle of a sword, or some such instrument.
4. A Morocco boy's shoe.
5. A sort of spur.

Dr. PAPIN, by a small alteration in his apparatus, made turpentine to pass through plaister of Paris, so as to make the plaister transparent<sup>1</sup>; the same method being applicable to wood, and other things.

He also proposed, and it was agreed upon for the next meeting, that a kidney, or some other body to be anatomized, might be very much swelled in the exhausting engine, and afterwards more dilated by the driving in of some convenient liquor.

April 30, Sir CYRIL WYCHE president in the chair.

The president related, that Mr. FLAMSTEAD had seen a spot in the sun on the 25th of April, and since as often as the weather would permit. The line, which it had described, was drawn on paper, and the places marked, that it would be in, every day till the 7th of May; after which time it would get behind the body of the sun<sup>2</sup>.

Upon mentioning the bay-tree to be the laurel of the antients, it was added, that great use was made of the berries for cookery, till such time as East-India spices were brought in.

A letter of Signor MALPIGHI to Mr. ASTON, dated at Belogna November 9, 1683<sup>3</sup>, was read, accompanying his discourse *De cornuum generatione et uteri fabrica*, written about three years before, and addressed to Dr. SROD, but never

<sup>1</sup> Register-book, vol. xi. p. 178.

<sup>2</sup> Mr. FLAMSTEAD's account of this spot is printed in the Philosophical Transactions, N°

157. p. 815 for March 1681.

<sup>3</sup> Letter-book, vol. ix. p. 177.

1684.]

ROYAL SOCIETY OF LONDON.

printed. It being too long to be read at present, Dr. AIGLON B V  
peruse it, and give some account of it.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-colle-  
22, 1684. ", was read, concerning a mathematical engine lately  
ris, made very commodious for travelling, and so light, that it  
in the pocket, serving for a fermicircle, sector, or square, measuring  
angles whatever, taking the weight of bullets, the declination from the  
inclination or reclination of any wall, &c.

This letter mentioned likewise one of Mons. AUZOUR to Dr. THOMAS SMITH,  
in which he affirmed, that he had seen in Italy little loadstones, which raised so,  
and some 140 times their weight: that in Nova Francia there is a vast quantity  
of salt petre in the fields: that in the West-Indies there are bees without stings.

Mr. MUSGRAVE added an account of the effects of the late hard frost in the  
garden of the university of Oxford; and of a light resembling the sun, seen by  
several carriers in Staffordshire going for salt at three o'clock in the morning  
on the 18th of March, probably the same with that mentioned in the news let-  
ters to have been seen at Deal.

Upon reading of Mr. MUSGRAVE's letter, Mr. HOOKE remarked, that a  
sector with sights might perform whatever the new mathematical engine at Paris  
was said to do.

Concerning the salt petre in Nova Francia, the fact was much doubted, be-  
cause it is a moist country, and northerly, and poor; whereas that commodity  
would have made it rich.

As to the bees without stings, Dr. LISTER said, that in England there was a  
little white nosed bee without a sting.

It being said in Mr. MUSGRAVE's letter, that trees of active juices had suffered  
most by the frost, Dr. LISTER answered, that the maple and sycamore had suffered  
all winter, and yet they had not suffered. Mr. EVELYN remarked, that splitting  
was often from want of juice; and he observed occasionally, that the platanus of  
Zinnar, a kind of myrtle, grows here very well in moist places.

Dr. LISTER acquainted the Society, that Sir WILLIAM DUGDALE having fe-  
veral Roman antiquities in his books not yet made public was willing, that the  
Society might peruse them, and take draughts of them: Upon which the Doctor  
was desired to return the Society's thanks to Sir WILLIAM DUGDALE, and to  
take the trouble of giving directions to Mr. HUNT what he should copy.

An account of the weather kept for three or four years by the last Archbishop  
of York, was presented, and thanks returned to his son by Dr. LISTER.

<sup>1</sup> It is printed afterwards in the Philosophical  
Transactions n° 160 p. 601 for June 1684.

<sup>2</sup> Letter-hood, vol. ix. p. 160.

<sup>3</sup> Dr. RICH. SMITH who died June 18, 1684.

P 2

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An account was read of Dr. LISTER's book of mineral waters, especially of the second exercitation, drawn up by the author himself, which was very acceptable, as being not only a summary, but an explanation of the treatise.

• *The Geometrical Key* of Mr. THOMAS BAKER, rector of Bishop Nympton in Devonshire, was presented to the Society.

Dr. PAPIN finding, that the lungs of a rabbit sunk upon the readmission of air in the exhausting engine, proposed, that they might be filled with plaister of Paris, wax, &c. or else be left *in vacuo* to dry<sup>1</sup>.

May 7, Sir CYRIL WYCHE president in the chair.

Upon reading the minutes of the last meeting, Dr. LISTER remarked, that the hive-bee of England was a foreign bee, as wheat and rye were foreign corn.

Mr. HOUGHTON mentioning a person, who was giving a horse a vomit, Dr. LISTER said, that a horse did not naturally vomit as a dog does: that probably a vomit would not work upwards with him, of which the want of a gall-bladder perhaps might be the cause: and that even a purge does not work kindly with him, but often puts him in danger.

Mr. HENSHAW said, that purges were given for the grease in horses with good success.

Dr. LISTER observed, that it might not be grease, which was called so: that a horse's blood was different from that of other animals, as being gellied as soon as cold; whereas a serum may be poured off from other blood.

A letter from Mr. WILLIAM MOLYNEUX to Mr. ASTON, dated at Dublin, April 22, 1684<sup>2</sup>, was read, as follows:

"I had before now answered yours of the 3d instant, but that I was unexpectedly prevented by some urgencies, which I have not yet so completely vanquished, as to return you at present so full an answer, as in time I may, to the demands of your last: for, besides the hindrances on my own side, our clerk has not transcribed our minutes to be sent you; and the gentleman, that promised experiments on blood, desires some time for repeated trials; and so likewise does Dr. MULLEN, who gave us formerly some magnetical experiments. But for these last, we may be for a while excused, seeing the Bishop of Ferns has not yet completed his scheme of quarries relating to the magnet: he is lately gone down to his diocese about thirty miles off, but he writes us word, that he is yet upon these papers, and will suddenly finish them, and send them to us: when we have them, I shall send you a copy. In the mean time I here send you what Sir WILLIAM PETTY brought in relating to land-carriages. We had, according to the directions of this paper, a fire-log mounted on wheels, sleds and

<sup>1</sup> Register, vol. vi. p. 177.

<sup>2</sup> Letter-book, vol. ix. p. 169.

" points,

"points, with which we tried some experiments, but we found them  
 "constant, that we could hardly rely upon them, till further trial.  
 "complete engine. If the Royal Society think this matter worth  
 "we shall again set about it. As to Sir WILLIAM PETTY's ships  
 "present say to much, as perhaps in three or four months hence I may  
 "may give you some satisfaction, I will let you know, that Sir W  
 "ever since he last came into Ireland been much incumbent on that  
 "has brought it (for as much as may be judged by models, of that  
 "vast and various apparatus) to a very great perfection; his vessels  
 "so much double-bottomed as his former; for as you see these which he has a  
 "water, you would not know them but by their lowness and  
 "from a common built; for now he calls them sluice-bottomed, for  
 "inverted, and a large sluice or *crena* runs alongst their back.  
 "models. he has one representing the common built Fubbs' yacht, for  
 "hear is the best sailer in England) and he has another likewise, in  
 "the sluice-Fubbs, in bulk, weight, &c. agreeing with the common  
 "different only in his additional sluice. Between these two, he  
 "in many particulars, as burden, draught of water, ballast,  
 "in all which the sluice bottom has wonderfully the advantage.  
 "he is encouraged to assert, that he will be bound to make a passage  
 "this and Chelster of about 80 or 100 run, that shall be as it were  
 "and shall be as constant in her going out, and returning upon  
 "whatever weather happen, as the stage-coaches between London and  
 "country-town. There was a motion between some persons of quality  
 "in this place (amongst which I had the honour to be one) of quality and any other  
 "building of a vessel that burthen, merely to try the experiment; and figure  
 "cond thoughts, it was reputed more advisable to begin with a barge of the  
 "same bulk and burthen with a barge, that belongs to our custom-house; but upon se-  
 "our sluice-barge do outlast considerably the other (which is now a building; for if  
 "much expected from her) the advantage of Sir WILLIAM PETTY's contri-  
 "vance will be so manifest, that it will suddenly be put in practice in a contri-  
 "model. In order to the accomplishing of this, there is a company of us to meet  
 "to-morrow at Sir WILLIAM's, and to agree about the matter; the success  
 "whereof you shall certainly know.

"And now from the water I will take you on shore, and let you know, that  
 "there is here a gentleman, one Mr. CLINET, a Dutchman by birth: he re-  
 "sides constantly at Limrick, who has invented a way for hindering coaches,  
 "chariots, and calashes, from all possibility of over-turning; and whilst they are  
 "of as plain and cheap a building, as the common ones. I have had some im-  
 "perfect relations of the contrivance from those, that have seen the model, but I  
 "will not thereupon venture to describe it to you. We would fain have had him  
 "expose it to our Society, promising him to put him into a way of making con-  
 "siderable advantage of it; but he was shy, and will not expose it further till he  
 "get apatent for the monopoly: but how little men usually get by these, I leave you  
 "to judge; whereas we would certainly have put him into a way of advantaging  
 "himself

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 for their keel is  
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 (which we  
 calls  
 build, and  
 makes comparison  
 swift sailing, &c.  
 In fine, hereby  
 set between  
 few days, let

"himself thereby; for of himself he will hardly be able to struggle with some difficulties he will meet with, &c.

"According to my promise in my last, I here send you our minutes, desiring you to send them forward to Oxford. I promised likewise to give you some further account of our progress towards putting into practice Sir WILLIAM PETTY's contrivance of ships. We are now resolved to build two vessels, one a barge, as I mentioned to you in my last, which (with the charges of experiments, that are to be made with it) will stand us in about 60 *l*. The other will be a vessel between 90 and 100 tons, designed for a passage-boat between this and Chester: for the carrying on of this, there are several, that do join parties, each putting in 20 *l*. When we have more nicely agreed about the dimensions of this latter, I will give you a fuller account, and so of the contrivance, burden and charge of building, which we reckon will be about 400 *l*. In the mean time be pleased to approve of and accept our good intentions, &c."

This letter inclosed the minutes of the Dublin Society from March 17, 1684, to April 21, 1684, as follows<sup>a</sup>.

"*March 17, 1684*, Sir WILLIAM PETTY produced a paper of experiments relating to land-carriages. These are registered.

"Dr. MULLEN related an experiment he had lately made on a dog, which is as follows: he injected into his thorax about eighteen ounces of water, and found in four or five days the dog to grow short-winded; but giving him an ounce and half of crocus metallorum, though it wrought only by siege, yet he was recovered perfectly thereby. He also confirmed his former observations in the ear of a pullet.

"*March 24, 1684*, Sir WILLIAM PETTY produced an engine for trying experiments relating to land-carriages, and discoursed of some experiments he had made therewith, in order to the answering some of the queries he had formerly proposed. The instrument was a solid parallelopiped of fir five inches thick and 10 inches long, weighing ninety-nine ounces, being so ordered, that it may be put on wheels, either one set, or two sets, of equal or unequal diameters, or it may be made a sled, or to be drawn on four, or two dragging wheels, or on the full flat. Ordered, that the experiments be tried before the company, that the particulars may be registered. Wednesday next appointed to begin these experiments at Sir WILLIAM PETTY's house. Dr. MULLEN shewed some experiments upon runnet, or dissolved coagulium, viz. mixing spirit of hartshorn and coagulium together, and pouring milk to them, the milk was not turned. So likewise salt of tartar mixt with the coagulium hinders its effects in curdling of milk. But spirit of wine mixt with the coagulium does not hinder the coagulium from turning the milk. He also mixt salt of tartar and coagulium in a spoon, thereby converting the salt of tartar into a greasy unctuous consistence like soft soap. He likewise related to us an experiment he had lately made

<sup>a</sup> Letter-book, Vol. ix. p. 172.

by injecting at several times about three ounces of dissolved coagul<sup>um</sup> into the jugular vein of a dog, who, in a short time of about two or three minutes after the injection, had all the symptoms of a woman in mother-fits, <sup>195</sup> cough breathing, whining, &c. but would recover out of them in about two or three minutes more: he perceived also, that the coagulum made out the venal blood as florid as that of the arteries. Mr. BULKLEY produced a male body of a bat or vesperilio, which he had lately dissected, and thereupon the venal count of the dissection of the like animal by Mr. THOMAS MOLYNEUX read an account 1682; containing many observable particulars relating to the venal system omitted by authors. Mr. BULKLEY likewise shewed us, as observed in the self, that the curious wings of that flying beast are double, consisting of two most thin membranes. Ordered, that the thanks of the Society be returned to Mr. THOMAS MOLYNEUX for communicating to us his dissection of two vesperilio; and that the account thereof be registered.

April 7, 1684, Dr. HUNTINGTON entertained the company with the view of the court on the porphyry pillars in Ægypt, producing the pictures with some discourse taken upon the place: he promised to draw up his thoughts on them more at large in writing, that accordingly they may be transmitted over to the Oxford Society. Mr. PATTERSON produced an account of some experiments he had made for dissolving the calculus humanus by various menstrua. Ordered, that he put them into writing, that they may be registered. The remaining time was taken up in promiscuous discourse on the late experiments had been tried relating to land-carriages, and ordered, that some further experiments should be made therein: next Wednesday appointed for the trial thereof at Sir WILLIAM PETTY'S house.

Likewise there was a paper produced, containing a catalogue of the discoveries and inventions of this and the last age.

April 14, 1684, we first met in the room we had taken in Crow's-nest. Mr. WILLIAM MOLYNEUX shewed the company an experiment of viewing pictures in miniature with a telescope; and afterwards read a paper of the theory and uses thereof. This is registered.

Mr. ST. GEORGE ASHE read a discourse concerning the evidence of mathematical demonstration, and the reason thereof, above other sciences: likewise he proposed, that any proposition of EUCLID may be proved independent from all other propositions of the elements, merely by first settling the definitions of the names you design to use in such a demonstration: this he illustrated ingeniously in Prop. 47. 1. El. and in Prop. 16. 6. El. Evct. This is registered. He also produced a stone curiously wreathed like a screw of a very fine thread, promising to procure more figured stones for us from a place he had lately visited in the country. Dr. MULLEN gave us an account of some experiments he had lately made on dogs, and on blood, and runner. These are to be registered at large. Dr. HUNTINGTON read an account he had writ of the porphyry pillars in Ægypt to Dr. PLOT. A letter was read from Mr. AVON, S. R. S. It contained Dr. LISTER'S account of the baroscope. April

April 21, 1684, Mr. MOLYNEUX produced a letter, which he received from Mr. MUSGRAVE, containing the minutes of six meetings of the Oxford Society: these were so very curious and acceptable, that discourse thereon took up almost our whole time of meeting. Dr. SMITH's ingenious and probable conjecture about the under current in the Straits was read. Ordered, that the thanks of the Society be returned the learned Doctor, for communicating to us this account.

"Dr. LISTER's compendious method for observing the altitudes of the quicksilver in the baroscope was exposed, and highly approved of. Mr. WILLIAM MOLYNEUX promised, that he would put this into practice, by observing the weather accordingly. Dr. MULLEN produced an hen's egg, wherein he shewed the company very plainly the punctum saliens. A letter was produced from Mr. WILLIAM HODDER of London to WILLIAM ELLIS, Esq; secretary to his Excellency the Lord Deputy, which contained a scheme of three fairs and two rainbows, that were seen off the fourth sands head at seven in the morning on March 18, 1681. Ordered, that the thanks of this Society be returned to WILLIAM ELLIS, Esq; for communicating to us this curiosity."

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, May 2, 1684<sup>b</sup>, concerning the supposed petrified heel of a shoe; which being broken in boring, was judged to have been always stone.

This letter accompanied one of Dr. HUNTINGTON to Dr. PLOT, dated at Trinity-college, Dublin, April 14, 1684<sup>c</sup>, concerning the porphyry pillars in Ægypt, and the queries, whence they were probably taken. There were also shewn the figure of an aguglia at Alexandria, and of another at Matarca.

Dr. GALE shewed a passage in a manuscript in his possession concerning the *Ignis Græcus*, describing punctually the way of making fire-works with gunpowder. This manuscript seemed to have been written in the time of King HENRY III. since the hand-writing resembled that of that age, and the history containing it was of that time.

Mr. AUBREY presented a bundle of mathematical papers, written by Mr. THOMAS MERRY; for which he was desired to return the Society's thanks to the widow; and the papers were put into Mr. PAGET's hands, to supervise, and make an inventory.

In the experiment made by Dr. PAPIN, the plaister of Paris was driven as low as needed to be into the wind-vessels; but upon the intermission of the air into the receiver, all the other vessels stunk; so that it seemed, that the veins and arteries too should be filled one after another with different compositions, that in dissecting they might be distinguished<sup>d</sup>.

<sup>b</sup> Letter-book, vol. ix. p. 177.

<sup>c</sup> Ibid. p. 178. It is printed in the Philosoph.

Trans. N<sup>o</sup> 161. p. 624.  
<sup>d</sup> Register, vol. vi. p. 178.

May 14, Sir CYRIL WYCHE president in the chair.

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An account was read of the first appearance of the late spot in the sun by Mr. FLAMSTEAD: and a scheme was shewn, not only of the passage of that spot over the sun, but, if the spot be not in the mean time consumed, its line of return; and the places of appearances every day were marked from the 22d of May to the 3d of June, inclusive.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college, Oxford, May 7, 1684\*, was read, giving an account of some stones resembling a pullet's heart and partridge's egg, and the shining of glow-worms.

Mr. HENSHAW remarked, that a glow-worm with the heat of the hand loses its shining, and in the cold recovers it again.

Dr. LISTER observed, that in the West-Indies there are glow-worms as long as one's thumb: that they are of a beetle-kind: and that he had met with some of that kind here in England.

A letter of Mons. JUSTEL to Mr. ASTON was read, mentioning, that he had been informed by a letter from Mons. AUZOUT, that at Roan had been made a barometer of glass sealed hermetically at both ends, so as to have no communication with the air; and that it was as servicable as another barometer: that CASINI had seen the spot in the sun; and that it was thought, that he had observed a new satellite about Saturn.

A letter of Signor MALPIGHI to Mr. ASTON, dated Bologna, March 23, 1683, N. S. †, was read, returning thanks for the books last sent him by the Society, and mentioning the burning of his house in the preceding month, whereby he had lost all his *adversaria* and microscopes.

A paper of experiments proposed by Sir WILLIAM PETTY to be made with relation to land-carriage ‡, and transmitted to the Society from Dublin, was read, and ordered to be registered §.

Part of a letter of Mr. LEEWENHOECK, dated April 14, 1684\*, was read; and the other part reserved till the next meeting. It was concerning the structure of the crystalline humour of the eye, which he described as consisting of many scales lying upon one another, and the scales as made of threads lying by one another in a very curious manner, as appeared from the figures.

In discoursing of the hermetically sealed barometer made at Roan, Mr. PIGOT

\* Letter-book, vol. ix. p. 185.

† Ibid. p. 195.

‡ Printed in the *Philos. Transact.* No. 164.

§ Ibid. for July 1684.

Vol. IV.

¶ Ibid. p. 187.

§ Register, vol. vi. p. 123.

It is printed in the *Philos. Transact.* No. 165.

p. 790. for November 1684.

fals.

said, that in the upper part of the barometer, thought generally to be void of air there was contained a body capable of dilatation by heat.

A barometer being brought, he held the flame of the candle to the upper part of the quicksilver, and after a little time the quicksilver sunk  $\frac{1}{4}$  of an inch or  $\frac{1}{2}$ .

Mr. Hooke thought, that the glass might not be well cleaned of the air, and proffered to get one better cleaned against the next meeting.

Dr. PAPIN intending to examine the specific gravity of the air comparatively to water, the receiver broke in exhausting, and hindered the experiment.

He proposed another experiment, which was to know how much a certain degree of moisture will increase the gravity of the air.

An account of the ancient use of gun-powder having been read at the last meeting, there was now produced by Dr. GALE a parallel passage of ROGER BACON.

May 21. Upon mentioning the shining beetle or flying glow-worm, Dr. LISTER said, that the characteristic of it was, whether it shines, or does not shine. If a person puts his finger on the back of it, it strikes with a strong spring, or gives a jerk.

Upon mentioning Mr. LEEWENHOEK's letter on the crystalline humour of the eye, Dr. GREW remarked, that this humour, if it were only boiled, shewed several parallel lines or threads running on the surface.

There was communicated from the Philosophical Society at Oxford a discourse read before that Society, May 7, 1684, by ROBERT PLOT, LL.D. director of experiments to the said Society, concerning the sepulchral lamps of the antients, shewing the possibility of their being made divers ways.

Dr. PAPIN having exhausted the air out of a Florence flask, and counterpoised it, found the returning air equal to  $41\frac{1}{2}$  grains.

It was farther observed, that the baroscope, hygroscope, and thermoscope, at the time of the experiment, stood in the Muteum at the following heights, viz.

Baroscope . . . . .	29 $\frac{1}{4}$ inches
Hygroscope . . . . .	20 deg.
Thermoscope . . . . .	65.

This was observed, to the end, that upon repeating this experiment, when two of these instruments are in the same degree, the different weight of the air may be attributed to the third. The account hereof was entered in the register as follows:

<sup>1</sup> Register, vol. vi. p. 127. It is printed in the *Philos. Transactions* N<sup>o</sup>. 166. p. 106. for

December 1684  
Vol. vi. p. 121.

" There

" There was counterpoised in a balance a Florence flask well exhausted of air, as did appear by the gage included therein: then having let the air into the same, its weight was found increased by  $4\frac{1}{2}$  grains: having afterwards weighed the water, that could fill the same flask, it was found to weigh five pounds wanting an ounce averdupois, which being reduced to grains, made 33735: from whence it was concluded, that the specific gravity of water, to the specific gravity of air, was at that time, as 33735 to 414, or as 817 to 1: thereabout, and at the same time the baroscope was at 29 inches  $\frac{1}{2}$ , the thermoscope at 65, and the hygroscope at 20.

" The design of this experiment was to know, how much a certain degree of heat, and a certain degree of moisture, will increase the gravity of the air: for it will be easy in winter-time, when the baroscope and hygroscope stand in the same degree, to repeat the same experiment, with the same vessel, and the same gage: so we may be sure, that all the increase, that will be found in the weight of the air, must proceed merely from its being contracted by the cold; whose degree may easily be observed in the weather-glass. In like manner, when the thermoscope and baroscope will stand in the same degree, but the moisture of the air shall be differing, the same experiment may also be repeated, with the same vessel, and the same gage: so we may be sure, that all the difference in the gravity of the air must come from the differing moisture."

The second experiment of Dr. PAPIN was thus: There were taken two pieces of iron, weighing each  $13\frac{1}{2}$  grains. These pieces were each put at the same time into an equal portion of aqua fortis in a like glass: but one glass was put *in vacuo*, the other exposed to the air: after a convenient time, the remainder of the iron *in vacuo* was found  $12\frac{1}{2}$  grains. The remainder of that in the air was but  $2\frac{1}{2}$  grains.

Upon mentioning the phosphorus, Dr. LISTER said, that there was a place in the Macchabees, book II. ver. 9. concerning the fire hid in the pit, which had a great resemblance to it.

It was also observed, from a passage in JULIUS SOLINUS, that the vestal fires of the Romans kept at the Bath were supplied with sea-coal: *Perpetui ignes nunquam constant in favellis, sed ubi ignis tabuit, vertitur in globos saxorum*.

Mr. HOOKE read a discourse shewing the way how to communicate one's mind at great distances.

May 28. A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, May 13, 1684, was read, mentioning from a letter from Paris a new sort of thermometer not above three inches long, and four or five lines in diameter, the inner pipe containing the refined quicksilver not half a line, useful for shewing the duration, increase and diminution of fevers.

<sup>†</sup> SOLINUS POLYHISTOR, c. 25.

<sup>‡</sup> It is printed in his *Philos. Experiments and Obs.*

*feriens*, p. 142.

<sup>\*</sup> Letter-book, vol. ix. p. 196.

This

This letter mentioned likewise, that CUTHBERT's beads were found not to be properly *serena stones*, as they were commonly termed, but a conjunction of amuleta, which may be loosened from each other by lying a night in vinegar.

Mr. HOOKER read a paper concerning the reason of the quicksilver's standing sometimes far above the usual height in the Torricellian experiment.

He also shewed, that a glass pipe closed at the top with a great many very small pipes, when it was put in water up to the top, and there raised, kept the water suspended a good way above the level.

An account of the experiments made at the last meeting by Dr. PAPIN was read, and ordered to be registered\*.

The dissolution of iron by aqua fortis *in aere* having been found at the last meeting to that *in vacuo* as  $12\frac{1}{2}$  to  $2\frac{1}{2}$ , upon a repeated trial at this meeting it was found but as  $10\frac{1}{2}$  grains to  $3\frac{1}{2}$ .

But two equal pieces of iron having been put in a mixture of equal parts of aqua fortis and spirit of wine, the dissolution *in vacuo* was  $1\frac{1}{2}$  gr. in the open air but  $\frac{1}{2}$  a grain.

June 4, Sir CYRIL WYCHE president in the chair.

There was read the latter part of Mr. LEEWENHOECK's letter of April 14, 1684, concerning the crystalline humour of the eyes of birds and fishes; the vitreous humour; the cornea-tunica; and the colour of a Blackamore.

As to the moistness of the cornea, Dr. GREW said, that it proceeded only from the glandules in the eye; and that no part of it transudated through the cornea, as Mr. LEEWENHOECK thought might be probable, upon observing the eye parched with the fire.

With regard to the colour of Blackamores, Dr. LISTER remarked, that it had been affirmed to be from a blackness in the blood, which he desired might be carefully inquired into, there being so much opportunity of doing it.

He said, that there was an ape in the Indies, whose blood died a purple colour.

A letter from Mr. JOSHUA WALKER to Mr. ASTON, dated at Brazen-nose college at Oxford, May 28, 1684†, was read, mentioning, that Mr. MUSEGRAVE going out of town had desired the writer of this letter to supply his place in writing; that at the meeting of the Philosophical Society at Oxford in the day before it had been mentioned, that there was an account of Ignis Græcus in an Arabic manuscript in St. John's college library in that university, and in JULIUS AFRICANUS's Celsi: that Dr. PLOT had shewed the experiment of holding a

\* Register, vol. vi. p. 182.

† Letter-book, vol. ix. p. 159.

live coal to the lower part of an hour-glass, which immediately stopped the running of the sand: and that there had been produced at the said Philological Society a model of the roof of a church, which might be built seventy feet wide without a pillar, with a paper shewing, that such a roof would be strong enough for use.

On occasion of the passage relating the hour-glass's stopping its running upon holding a live coal to the under-part, Mr. RICHARD WALLER observed, that the reason of this thing happens by putting the warm hand to it; and that this might be occasioned by the rarefaction of the air.

Dr. LISTER shewed some ore, which had been sent by Dr. PLOT, as copper-ore of Staffordshire: but upon trial he found it to contain nothing but iron; and some of it calcined applied to the magnet, as was then seen.

Dr. LISTER shewed also some viviparous snails, which he had taken up in the Thames.

One of these snails being anatomized by Dr. TYSON, the womb was found very full of little snails.

The scarlet snails upon touching them with salt yielded in a basin of water a great quantity of very florid juice.

An extract of a letter of Mons. AUZOUT to Mons. JUSTEL, dated at Paris, June 3, 1684, N. S. was read, concerning a discourse of Mons. HUYGENS lately printed about the use of long telescope-glasses without tubes.

Mr. FLAMSTEAD remarked, that he had seen the spot in the sun since its return; and that there were two other spots newly added.

Dr. PAPIN, upon occasion of an experiment made at the last meeting, shewed how water, well purged of air, remained suspended at the top of a pipe closed at the upper-end, and standing with the other end in a vessel of the same water *in vacuo*.

Upon shaking the engine, the water in the pipe fell within a little of the level of the water in the vessel. But upon working the engine, it rose a little. His account of this experiment was as follows:

"A glass pipe being exactly filled with water, purged of air (because it had been kept twenty four hours *in vacuo*) the aperture of the said pipe was immersed in a vessel, containing some of the same water: these being put *in vacuo*, the water did still remain suspended, to the very top of the pipe, ten inches higher than the air could counterpoise it: but by shaking the engine, the same water was caused to fall on a sudden, and it remained in the pipe, about half an inch higher than the surface of the water in the vessel. So that it was plain,

<sup>2</sup> Letter-book, vol. ix. p. 100.

<sup>1</sup> Register, vol. vi. p. 173. "that

"that the suspension of the water, to the top of the pipe, could not in this occasion, be ascribed to the pressure of the air."

June 11. A letter of Mr. JOSHUA WALKER \* to Mr. ASTON, dated at Oxford, June 4, 1684<sup>b</sup>, was read, giving an account of the proceedings of the Philosophical Society there; that it had been remarked, that there is an antient account of Ignis Græcus in CONSTANTINUS PORPHYROGENITUS's advice to his son, and that it is mentioned by MATTHEW PARIS in the Life of King HENRY III. That a description had been given in by Mr. WHEELER<sup>c</sup>, of a watch, which was to move upon a declivity like that at Greenwich: that Dr. PLOT had communicated an account of vines: and that it had been observed, that white grapes had suffered more by the last great frost than the red.

Two brass half globes joined together and exhausted of air being said to sustain a great weight, Dr. PAPIN made a trial with a small glass-receiver shut with a glass cover, and exhausted of air. There being some water in the receiver, it was shaken till it was dispersed all about the receiver; but the fear of vacuum did not keep it from condensing and falling down again. The glass receiver bore up a weight of twenty eight pounds, and afterwards of ten pounds more added to it. Dr. PAPIN's account of it was as follows<sup>d</sup>.

"We took a glass receiver, shut with a glass cover, and exhausted of air: but there was a small quantity of water included in the same: and shaking the said receiver, all the water was dispersed through the whole capacity; but it fell down again, so soon as we left off shaking: so that it did appear, that the vacuum in the middle of the receiver is not able by its attraction to keep the watery particles from condensing and falling down: nevertheless having hung twenty eight pounds weight to the cover, it lifted up rather than separated the said cover from the receiver: but having made a small hole to let the air into the receiver, the cover did separate and fall down of itself, though there was no more weight to draw it: so it seemed plain enough, that it was only the want of the ordinary pressure of the air within the receiver, that gave occasion to that strong adhesion of the cover to the receiver."

Dr. LISTER shewed the experiment, that spirit of wine and oil of vitriol, though they separately dissolve sanguis draconis and oil of vitriol, yet being mixed equal parts, they dissolve neither the one nor the other.

A plough was shewn from Mr. HOUGHTON, such as was used in many parts of France, and at Barking in Essex, having two side-boards, whereby the earth is thrown both ways, and going but once to make a ridge, such as in Essex was done at four times. This, as it was of great dispatch, so its being drawn by but

<sup>a</sup> Letter-book, vol. ix. p. 202.

<sup>b</sup> MAURICE WHEELER, M. A. rector of Sibbertoft in Northamptonshire. His letter to Dr. PLOT dated May 22, 1684, concerning his

watch, is printed in the *Philos. Transact.* N<sup>o</sup>. 161. p. 647.

<sup>c</sup> Register, vol. vi. p. 187, 184.

two oxen fastened at the horns and with but one man, saves much expence in the second and third ploughing.

A book, intituled, *Dialogue de la santé*, was presented by Monf. JUSTEL from the author Monf. D'ARLANCOURT; and referred to Dr. AGLIONBY to be perused.

June 18, Dr. GALE gave an account of a great earthen urn, found lately at Peckham in Surrey. He inferred, that it might probably direct to the Roman way, which had been thought to pass near that place.

He produced a copy of an inscription of an old Roman altar, dug up at Westchester in 1683, which had not yet been printed. It was ordered to be preserved, and was as follows:

" L O M TANA RO.  
 " T. ELUPIUS GA LER..  
 " PRÆSENS GV N A.  
 " PRL LEG X X: V..  
 " COMMODO ET  
 " LATERAN O  
 " COSS.  
 " V. S. L. M.

Dr. GALE was desired to procure the urn found at Peckham to be brought to the Society as soon as he conveniently could.

Monf. JUSTEL communicated in a letter to Mr. ASTON, the figure of a knife belonging to one Monf. QUINOT of Troyes in France, but supposed to be brought from Constantinople. The blade was of damasked steel; and if it were bent one way upon the hand, or a soft body, there came from one part of it near the point a kind of a doleful noise. If the blade were struck upon a hard body (as a table) it sounded as if it were broken.

A letter of Mr. MOLYNEUX to Mr. ASTON, dated at Dublin, June 7, 1683, and the minutes of the Society at Dublin, from April 28 to June 2, 1684, were read; which minutes were as follow:

" April 28, 1684, Several of the Society being absent, there was little done of any moment.

" May 5, 1684, A letter from the bishop of Ferns was read, wherein he proposed suddenly to send us the continuation of his magnetical queries. Ordered, that the thanks of the Society be returned for this favour. An eclipse of the sun being expected next July 2, it was ordered, that it should be calculated from several of the best modern tables, and observed accordingly. Mr. MOLYNEUX and Mr. ASHE took upon them this task. Mr. BULKLEY read:  
 " Letter-book, vol. ix. p. 204.      " Ibid. p. 205.      " Ibid. p. 187.      " and

“ and shewed some experiments of the luctation of divers alcali's and acids, in  
 “ pursuance of Dr. GREW's experiments of that kind. Dr. MULLEN gave an  
 “ account of a person lately dying of a consumption. This is registered. He  
 “ and Mr. MOLYNEUX report, that the account and figures of the Sirones, or  
 “ Acari, given in the Leipstick acts, anno 1682, are very genuine and true, as  
 “ they find by lately viewing them with a microscope. Dr. MULLEN gave a  
 “ dog a die, and he kept it in his body twenty-four hours; when it came out, it  
 “ had lost half its weight, but retained its cubical figure most accurately, and  
 “ every point on each side.

“ May 12, 1684, Dr. MULLEN added to his last account many observables he  
 “ lately met with in the body of a man dying of a consumption. On this occa-  
 “ sion, Sir WILLIAM PETTY was pleased to entertain the company with some in-  
 “ formations of the like nature. Mr. ASHE exemplified his last mathematical  
 “ discourse by several other instances in EUCLID's propositions. It was observed,  
 “ that our Irish mortar is much more hard than that of England; our lime being  
 “ all made of a marble stone; whereas the lime of England is generally made  
 “ of a chalky stone, and is therefore more apt to moulder away, unless pre-  
 “ served from the wet. It was therefore to be wished, that the builders of St.  
 “ Paul's had taken this into consideration, and used Irish lime. From a French  
 “ gentleman in the country a letter was read, containing his thoughts of the trees,  
 “ which are frequently found deep under ground. These he thinks to be trees  
 “ *sui generis*, and that they there seed and grow, for which he offers several rea-  
 “ sons, with a confutation of that opinion, that makes them the effects of deluges  
 “ or inundations, overwhelming the places where these are found. Next Mon-  
 “ day, being Whitfun-monday, adjourned to this day fortnight, being May 26.

“ May 26, Mr. MOLYNEUX opened before the company a water-newt, which  
 “ he takes to be the salamandra aquatica. In the body of this animal there  
 “ are two long *sacculi aerei*, on which the blood vessels are curiously rami-  
 “ fied: to these blood vessels applying a microscope, he shewed the circula-  
 “ tion of the blood *ad oculum* as plainly as water running in a river, and more ra-  
 “ pidly than any common stream. Likewise the pulsation of the heart was very  
 “ manifest.

“ A letter was read from Mr. J. K. containing many remarkable; as, 1. Of a  
 “ pit bottomless, because often attempted to be filled up, but in vain, in the mid-  
 “ dle of a plain large field. 2. Of a hen's egg he lately saw of this shape. 3.  
 “ Of the stones, which the country people call elf-darts, or fairy darts, in this  
 “ shape. 4. Of a destructive thunder, that lately happened about Tuam. 5.  
 “ *Mesolabium quo due medie inter duas datas inveniri possunt.* Ordered, that  
 “ the thanks of this Society be returned to Mr. J. K. for his ingenious communi-  
 “ cations. Ordered, that Mr. ASHE do consider this *Mesolabium*, and report  
 “ his thoughts thereof at our next meeting. Mr. MOLYNEUX shewed the com-  
 “ pany the scheme of the solar spot, as it was transmitted to him by Mr. FLAM-  
 “ STEAD, Astronom. Regius, informing them, that the spot did not suffer a se-  
 “ cond

" cond revolution ; for it was not seen upon or after the 22d of May, as it ought  
 " to have been, had it been consistent enough. Dr. MULLER reports these two  
 " experiments to have been lately made by him. 1st. A dog having about two  
 " inches in depth and between three and four in breadth cut off from one of  
 " the lobes, in the left side of his lungs, and the effusion of blood being hin-  
 " dered by a ligature of thread, the dog recovered perfectly, having the free use  
 " of his lungs, and particularly that of barking with a freedom from coughing.  
 " 2d experiment : the external jugular vein of a dog being about six weeks ago  
 " so tied, that no blood could pass, the dog continues very well, and perfectly  
 " free from all disorders, that may be ascribed to that ligature.

" June 3, 1684, Mr. MOLYNEUX did again shew the company the circulation  
 " of the blood in a dissected water-newt. Likewise he produced a paper contain-  
 " ing the observations of the weather for the last month of May, with the  
 " winds, and the height of the quicksilver in the baroscope, noted according to  
 " Dr. LISTA's ingenious and compendious method. Dr. HUNTINGTON pre-  
 " sented two bottles of mineral waters, brought from two several wells, lately  
 " discovered in Connaught, that experiments may be made on them. Ordered,  
 " that Dr. MULLER do make what experiments he thinks fit to discover their  
 " nature, and that he reports them to the Society. Mr. KING being suddenly to  
 " go down to the wells at Clewisi, desired the Society to draw up a paper of ques-  
 " ries relating to them. Ordered, that Dr. MULLER be pleased to draw up such  
 " a scheme of queries. Sir WILLIAM PETTY was pleased likewise to promise  
 " something to that purpose. Mr. KING read a large discourse he had lately  
 " written on hydraulics, and the most usual instruments used therein, shewing  
 " the conveniencies and inconveniencies of each, and concluding with an inge-  
 " nious proposal of his own. Sir WILLIAM PETTY was pleased on this occa-  
 " sion to inform the company of an hydraulic engine he had contrived to be moved  
 " by fire, and of the unsuccessfulness thereof."

Dr. GREW communicated part of a letter to himself from Mr. MOLYNEUX,  
 dated at Dublin June 7, 1684, wherein the anatomy of a water-newt or sala-  
 mandra aquatica was mentioned more particularly than in the preceding minutes  
 of the Dublin Society. It was as follows :

" About the middle of May, 1683, I sought in the ditches about this town  
 " several water-newts, which I take to be the salamandra aquatica of the natura-  
 " lists : several of these I dissected, and made many observations upon them ;  
 " all which I then communicated in a letter to my brother then in London. But  
 " the only particular I will trouble you at present is, that in them there are two  
 " long slender transparent air bladders, lying all along their back : on these air blad-  
 " ders the blood vessels are most curiously ramified : to which applying a mi-  
 " croscope, it is admirable to behold with what a prodigious swiftness their blood  
 " circulates, and this as plain as ever water was seen running in a channel. This  
 " I look upon to be the circulation of the blood, demonstrated *ad oculum* ; and  
 " that after this sight it is impossible for the most perverse to deny it : for if we

" make

" make an estimate of the whole mass of blood in this animal, which we shall hardly find amount to the quantity of six drops from a man's nose, we may well compute, that all that may pass in one of the channels, that the glass will discover, in two minutes or less. To this I will add, that the heart of this creature will continue its pulsation for eight or nine hours after the thorax is opened, and it may be seen as plainly as any object whatever, at every systole to whiten, and at every diastole to redden: as also to have various motions therein, according to its ventricles and auricles.

" This experiment has been dormant ever since, till this year the coming in of these animals gave me opportunity of repeating it, and representing it at our meetings, to the great satisfaction of all, that have seen it; and particularly Sir WILLIAM PETTY, though incapable of enjoying the sight, by reason of his eyes (to which I cannot fit the microscope, so as to see any thing distinctly) is pleased to think it a very useful discovery, &c."

The circulation of the blood being said to be visible in newts, Dr. LISTER affirmed the same to be visible in frogs, and some snails at some times, even through their shells. Mr. HUNT was ordered to provide some frogs against the next meeting.

Irish mortar being said to be harder than English, it was interpreted as meant only of that made of chalk, and not of hard stones, as is used in many places of the south of England, and all the north.

Upon mentioning Puzzuolane used in the mole of Tangier, Dr. LISTER said, that it might be had in England, it being nothing but the pyrites burnt: and that he had lately examined in the Society's *Museum* some of the dust from mount Vesuvius rained into a ship in the Levant, which applied to the magnet.

He likewise observed, that in pulling down the houses in Tangier the last year there were found many bushels of swallows, which had hid themselves.

Mention being made in the Irish minutes of subterraneous trees supposed to be *arbores sui generis*, Dr. LISTER remarked, that he had found of those trees standing upright, but covered, in the Pinna mofs upon the top of Craven: that the tops of the trees were often wanting, as being consumed by the firing of the mofs; and that the trees might be the betula, as had formerly been said.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford June 12, 1684<sup>1</sup> being read, mentioning a MS. discourse of Dr. BAINBRIDGE concerning the several ways of finding the longitude, the secretary was ordered to write, that it might be communicated.

Dr. PAPIN made an experiment towards finding the quantity of air contained in iron; his account of which was as follows<sup>2</sup>.

<sup>1</sup> Letter-book, Vol. ix. p. 206.

<sup>2</sup> Register, vol. vi. p. 135.

" In a Florence flask, that contains  $4\frac{1}{2}$  grains of ordinary air, was included 29 grains of iron, with a sufficient quantity of *aqua fortis* to dissolve them, and a mercurial gage. The said flask was evacuated till the remaining air could sustain no more than seven inches of mercury: then the iron was caused to fall into the *aqua fortis*, which began to work but slowly, and caused but little alteration in the height of the quicksilver; but after a while it wrought so briskly, that the mercury in the gage was seen to rise very sensibly, near to the height of fifteen inches, but after the dissolution was ended, the mercury descended a little, and at last it remained in the height of fourteen inches; so that, by the said dissolution, there was produced of constant air as much as will counterpoise seven inches of quick-silver: which quantity of air, in proportion to the ordinary air contained in the same flask, must weigh  $9\frac{1}{2}$  grains, or little more: and so it was about the third part of the weight of the iron, that had been dissolved.

" As for the knowing, whether so much air doth proceed from the dissolving or from the dissolved body, the hon<sup>ble</sup> Mr. BOYLE intends to make several experiments, and to give an account of their success to the Royal Society."

Mr. HENSHAW queried, whether the acquired air might not rather come from the *aqua fortis* than the iron.

Dr. PAPIN answered, that there might be other experiments made to shew whence the air comes.

He also reported an experiment made at Mr. BOYLE's about suspending water in a bolt-head, which was ordered to be registered, as follows:

" On Tuesday the 10th of this month, a bolt-head full of water purged of air was inverted in a vessel containing some of the same water; and so being put in *vacuo*, the water rested suspended in the bolt-head; but by shaking the engine, it fell down, as such water used to do: then, by letting the air into the receiver, the water ascended again into the bolt-head, only there was a small bubble of air at the top of it. This being left so in the open air, the bubble in three days time disappeared; so that the water without filling the bolt-head any more exactly remained suspended in *vacuo*, though it had been three days exposed to the external air. The same water having been caused to fall down by shaking the engine, and then remaining exposed to the external air four days together, it did again imbibe, and make disappear a bubble of air, that was at the top of it: so that without filling the bolt-head any more exactly, the said water remained yesterday suspended in *vacuo*, as well as any water purged of air; though it had not been kept in *vacuo* above a quarter of an hour in seven days time."

June 25, Sir CYRIL WYCHE president in the chair.

The specimen of Mons. MORELLI, in order to the printing his general work on medals, was presented by Mons. JUSTEL in the author's name.

Register, vol. vi. p. 184.

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Mr.

Mr. HOOKS read a paper of remarks about the manner of observing with long telescope-glasses without a tube.

Dr. LISTER, who had promised to shew the circulation of the blood in frogs, being absent, it was deferred till the next meeting.

He having mentioned, that *Puzzuolane* might be found in England, it was desired, that he would order some trials to be made before the Society.

Subterraneous trees being supposed to be *betule*, Dr. PLOT said, that he had known some of them fir, having six branches growing regularly at due distances; and that a great many firs grew naturally in Staffordshire to the height sometimes of forty seven yards. He intanced in Norbury of that country.

There was shewn an account of the weather during the month of May last, as it was observed at Dublin by Mr. WILLIAM MOLYNEUX.

This introduced a discourse about repairing the weather-engine, which was referred to farther consideration.

Dr. PAPIN shewed the experiment of dissolving soap in salt-water by means of his digesting engine; which he supposed might be serviceable for washing linnen at sea. The brine lathered well, and was smooth, though it had been half a quarter of an hour in preparing. His account of this experiment was as follows:

“ The cleanness of the linnen cloth at sea being a great help to keep men in good health, and the washing of it requiring a great deal of fresh water, I thought it would be an useful thing to find a way to wash with salt-water. I have therefore put some soap, with salt-water, in two vessels, and having left one in the open air, I have included the other in the digester, and put fire to it, till a drop of water at the top of it would evaporate in thirty seconds: and then having put out the fire, I have found, that the soap in the open air was not at all dissolved; but that in the digester was very well dissolved, and even more than other soap, that I had put at the same time in fresh-water: so it is likely, that soap so well dissolved would fetch out all the grease and dirt from linnen-cloth, as well as can be. Nevertheless, I must confess, that such soap doth not look so white as the other doth: and yet I am apt to think, that it would be, for all that, as good for health, which is the main thing at sea. I have to day repeated the same experiment, to shew it to the Royal Society.”

It was ordered, that at the next meeting it should be reported, how the water-proved in the washing of linnen.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, June 18, 1684.

• Register, vol. vi. p. 126.

• Letter-book, vol. ix. 257.

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was read, mentioning, that Dr. TURBERVILLE of Salisbury had not long before met with a distemper of the eye, till then perhaps undescribed and without a name. It was a bag of matter prominent from the tunica adnata. The doctor cured his patient, and called the disease *busa oculi*.

July 2. Sir CYRIL WYCHE president in the chair.

Monf. HUYGENS's *astronomia compendaria* was presented by Monf. JESTEL, and referred to the perusal of Mr. CLUVERUS.

Mr. HOOKE read a discourse concerning the manner of rowing used by the antients in their galleys; which he was desired to deliver in writing with a draught.

Sir ANTHONY DEAN presented for the repository an agate-like stone, consisting of large pebbles, lying in a very hard cement, which he had found in Hertfordshire in Sir CHARLES CASAR's grounds.

Mr. CLUVERUS delivered in a description of a monstrous child born February 29, 1684, at a village called Heilagger in South Jueland\*.

A Letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, June 27, 1684, is chiefly concerning his success in tying up the jugular veins of a dog:

"As to the tying of the jugular vein, as mentioned in the same minutes, I will acquaint you with what I have done of late in that kind. Some time in March last I tied the two external jugulars of a dog, and cut off the veins on this side of their respective ligatures, i. e. towards the heart; after which I expected, that the dog should have evacuated more plentifully than ordinary by way of spittle and tears, (as Dr. LOWER tells us the dog, on which he tried this experiment, did in a very considerable measure) but the event was quite otherwise; for I could not find, after diligent observation, that the dog, which I made use of, was any way concerned, otherwise than at the wound. I found no alteration in him at all, that I could impute to the stoppage of the circulation in the veins before mentioned. About three weeks after this, I tried another experiment on the same dog, under which he died. I examined him as to the jugulars I had cut alunder, and found them now almost dried up. When I have any leisure I will try this experiment once more, partly because my success in it was so very differing from that of Dr. LOWER, and partly also because if it succeeds with me a second time, as it did at first, and if the jugulars in men communicate one with another in so great measure, as by that time it will appear they do frequently in dogs; then (I say) we may hence conclude, that bleeding in the jugulars is more proper in many diseases of the head, than several physicians, who suppose no considerable communication betwixt the external jugulars and the brain, will allow: but of this more hereafter: only I desire you to observe, that if what I have written concerning the cutting off the jugulars, &c. be any

\* It is printed in the *Philos. Transact.* N<sup>o</sup>. 160. p. 599. for June 1684.  
 † Letter-book, vol. 1. p. 258.

" way questioned, the truth of it can be attested by Mr. PAINE of New-college,  
 " who saw the operation. I think Dr. PLOT heard me discourse of this experi-  
 " ment, with the success of it, about that time I did it.

Two papers were communicated by Dr. HUGH CHAMBERLAYNE; the one printed, being a proposal of one VILLEBRIESSIEN of Grenoble, to raise water by a new cheap engine of wood or oil-cloth, transportable by one man, &c. It bore no date.

The other was a proposal in a Dutch letter to Monf. COLBERT for finding the longitude by an hour-glass running complete twenty four hours, and having a pipe for communication of the air between the lower and upper glass. It was ordered, that this letter be translated, and a copy of it kept.

Two papers were shewn from Mr. HOUGHTON, being the number and ages of persons in two parishes, Hartley-Row in Hampshire and Holyrood in Southampton.

A discourse was communicated from Oxford concerning the making a watch to move upon a declivity, such as had formerly been contrived by EDWARD Marquis of Worcester, though never seen by the author, Mr. MAURICE WHEELER. The discourse being long, it was not read, but a copy ordered to be kept\*.

Another discourse was communicated from Oxford by Mr. JOSHUA WALKER concerning the figure of a church, which may be built seventy feet wide, without any pillar in it†. This also being long was not read, but ordered to be transcribed.

A discourse concerning the nation of Egypt by Mr. CHARLES LEIGH of Brazen-nose college, Oxford‡, was part of it read, the other part being referred to the next meeting.

Dr. PAPIN made a trial of softening a piece of box in the digesting engine to such a degree, as to make it capable of an impression from any hard body; which succeeded. His account of it was as follows\* :

" A piece of box being put in the digester with water, and the fire being increased, till a drop of water at the top of the digester did evaporate in two seconds, the box was found so well softened, that it did take an exact impression of a farthing; and it was judged, that by this means, the hardest wood might be softened enough to be printed, not only with several mathematical instruments, but even with the biggest medaillon, that ever was made: and

\* It is entered in the letter-book, vol. ix. p. 243. and printed in the *Philos. Transact.* N<sup>o</sup>. 161. p. 147. for July 1684.

† Letter-book, vol. ix. p. 236.

‡ Ibid. p. 216. It is printed in the *Philos. Transact.* N<sup>o</sup>. 160. p. 600.

\* Register, vol. 6. p. 187.

" such

"such wood in two or three days time comes to be at least as hard as ever  
"it was."

A paper was produced, communicated from Dublin, being a new and easy  
way of demonstrating some propositions in *Euclid* by Mr. ST. GEORGE ASH,  
member of the Philosophical Society of Dublin for promoting natural knowledge\*.

A transcript of part of a manuscript of Dr. BAINBRIDGE concerning the ways of  
finding the longitude was produced, as follows :

"Nullum est in totâ ferè mathesi problema, quod mathematicorum ingenia  
"magis exercet, nullum, quod astronomiæ et geographiæ magis conducit, quam  
"problema inveniendi meridianorum sive longitudinum differentias. Hoc pro-  
"blemate astronomi motuum coelestium epochas a meridiano radicali ad quemvis  
"alium transferunt : ejusdem radii geographi *tertium* terrarum orbem lustrant  
"describunt. Hoc est problema illud *εὐκλείδους*, in quo solvendo mathematici  
"non minus laborant, quam in duplicatione cubi aut quadraturâ circuli, nec mi-  
"nus desudant quam chrysopei chymiste in lapide suo excoquendo. Varia igitur  
"hujus problematis solvendi *εὐκλείδης* brevisse referre visum fuit, et de singulis  
"quid sentiam dicere..

"Primum epicheirema astronomicum et tenebris lucem profert, et ex umbrâ  
"radios, observando eclipses lunares, quæ transcurrente lunâ per opacam terræ um-  
"bram universales sunt : hoc est, omnibus terrenis globi incolis, a quibus spec-  
"tari possunt, eodem modo videntur, eisdem observationis quantitate et dura-  
"tione, sed non similem horis. Idem enim lunaris eclipsiis momentum, quod nobis  
"incidit in mediam noctem, aliis, qui magis orientales sunt, post mediam noctem  
"putatur, aliis vero, qui magis occidentales sunt, ante mediam noctem nume-  
"ratur : semperque horarum differentia proportionalis est differentiæ meridiano-  
"rum sive longitudinum.

"Hoc epicheiremate *PROLONÆUS* lib. 10. geographiæ cap. 4.º statuit Cartha-  
"ginem occidentaliorem Arabiæ Assyriæ gradibus 45.º. Siquidem idem eclipsi-  
"momentum, quod Carthagine contigit horâ noctis secundâ, in hâc eclipsi quam  
"râ noctis quintâ, ubi monendum, horas noctis temporales in hâc eclipsi quam  
"proxime æquales fuisse horis æquinoctialibus. Hæc enim fuit insignis illa lune  
"eclipsi, quæ facta est undecim diebus ante fatale prælium inter *ALEXANDRUM*  
"magnum et *DARIUM* ultimum Persarum monarcham, anno ante vulgarem  
"CHRISTI epocham labente trecentesimo trigesimo primo nocte post vigi-  
"mum diem Septembris Juliani *ἡγεμονικῆς* assumpti, paucis diebus ante æqui-  
"noctium autumnale, nocte vero post decimum quintum diem Boedromionis,  
"ultimi mensis Attici æstivi, *τῆς τῆς τῶν μαρτυρῶν Ἀλκιμῆς ἀπὸς* circa initium my-  
"steriorum Atheniensium. Undecimo vero die post eclipsim consensum fuit præ-  
"lium inter *ALEXANDRUM* et *DARIUM*, h. e. ut refert *PLUTARCHUS* in *ALEXAN.*

\* This paper is printed in the *Philos. Transact.* N.º. 161. p. 672. for August 1684.  
† Letter-book, vol. 1.º. p. 228.

"Nec minus dubium et perplexum est epicheirema tertium per distantiam lunæ a stellâ fixâ circa eclipticam posita: quæ distantia in altero loco observanda est, in altero vero ex tabulis lunaribus ad eandem horam derivanda. Hoc epicheirema prioribus difficultatibus novas addit, a modo observandi et parallaxis lunæ. Nam radius geometricus, qui huic observationi maximè idoneus censetur, distantiam iusto majorem exhibet, si non caveatur oculi eccentricitas, quod olim primus animadvertit ARCHIMEDIS in suo *ψαλμῶν* et ante annos sexaginta monuit doctissimus noster DIOGENES in alis mathematicis. Parallaxi vero lunaris, nisi luna fuerit in nonagesimo gradu eclipticæ distantiam observatam majorem aut minorem faciet, pro varia lunæ ad gradum nonagesimum et stellam fixam situ. Hoc tamen epicheirema imperitis naucleris venditare non desinunt triviales *πλάται* et circo mathematici: inter quos merito numerandus ille, qui novas hypotheses lunares, easque absurdissimas, hujusque epicheirematibus grati confertas, Maximo Cardinali dicare pro sua auctoritate non erubuit.

"Ad epicheirema quartum jam transco per *αἰτήματα*, quod motu æquabili perpetuo, solum aut aliquot multos dies aut menses, horas æquinoctiales transactas accuratissime indicabit. In discessu a primo meridiano, summâ diligentia per solem aut stellam fixam invenienda est hora æquinoctialis, ad quam index Autometri transferendus: deinde factio transitu ad alium quemvis meridianum, eandem solertia querendum, quot horæ transactæ fuerint a meridie aut mediâ nocte; quæ si pauciores fuerint horis ab Autometo indicatis, meridianus secundus occidentalior est; si plures, orientalis, semperque meridianorum differentia *ἀνάλογη* est differentie horarum.

"Hoc epicheirema a multis propositum fuit, inter quos ille, quem honoris causâ nomino, JOHANNES FERNELIUS, qui in præfatione ad libros de abditis rerum causis, HENRICO secundo Francorum regi proficitur, se excogitasse horarum æquinoctialium observatione, quâ ratione in quacunque orbis terrarum regione illius internosci possit longitudo: quod quidem assertit se de fontibus antiquorum non hausisse, sed de suis rivulis primum protulisse. Divinum FERNELII ingenium demonstrant monumenta ejus medica et mathematica, non tam cædo quam æternitate digna: puto tamen, imo dico (quod salvo tanti viri honore dictum volo) FERNELIUM sibi aliisque hic imposuisse. Nam primò, ut PTOLOMÆI nostri verbis utar, *ἡ μέντι δυσκολοῦ, ἀλλὰ καὶ παλαιῶν ἀνθρώπων*, in hujusmodi *ἀνθρώπων* commentis parare proprias cum materiis ARCHIMEDIS, POSIDONI, et DREBELII. Mira quidem prædicantur de sphaeris ARCHIMEDIS, POSIDONI, et DREBELII, nostrorum temporum mechanici solertissimi: at motum perpetuū æquabilem nec illi fecerunt, nec facient posterî: at motum efficiet sapientissimus mundi, *ἀνθρώπων* primulque cælorum motor DEUS o. m. Secundò, quod prius monui, nucleifera sunt inæqualia, eorumque æquatio nondum satis explorata.

"Quintum proponam epicheirema, illudque magneticum, per acis magneticæ circa eam vero meridianam declinationem. Compertum est, acis magneticæ circa insulam Corvo, quæ una est Azorum, recta spectare septentrionem: sed extra illum meridianum in hanc vel illam partem deflectere. Hinc mathematici nonnulli, ad pauca respicientes, meridianum illum propriarum statuerunt. "Polo

“ Polos (necio quos) magneticos, eorumque a Polis terræ distantiam inven-  
 runt: quibus positis, et datis ubique terrarum latitudine et declinatione mag-  
 neticâ, dari posse putarunt meridiani cujuscunque a primario illo distantiam.  
 “ Sed hoc epicheirema lubricum et incertum esse demonstrant observationes mag-  
 neticæ, quibus satis superque liquet, meridianum illum per insulam Corvo non  
 esse primarium; siquidem sub eodem meridiano navigandi ultra citraue illius  
 insulte parallelum acus magnetica nunc in hanc nunc in illam partem deflectit;  
 “ ideoque in illo meridiano non sunt Poli magnetici.

“ Præterea in aliis etiam meridianis nulla est  $\chi\alpha\lambda\upsilon\sigma\kappa\lambda\iota\sigma\iota\varsigma$  sive cuspidis  
 “ magneticæ declinatio, quod testantur observationes circa Promontorium Bonæ  
 “ Spei multoties factæ. Magnetem verò nullos certos Polos respicere, sed a magnis  
 “ terre continentibus huc et illuc trahi et librari, rectè docet GILBERTUS noster,  
 “ primus idemque doctissimus magneticæ philosophiæ magister; e cujus fontibus  
 “ CABEUS suos deduxit rivulos. Totum denique hoc epicheirema magneticam  
 “ suspèctum reddit nova suspicio, declinationem magneticam in eodem equidem  
 “ loco esse mutabilem. Siquidem declinatio magnetica, quæ ante annos quin-  
 “ quaginta quinque Londini comperta fuit graduum  $11\frac{1}{2}$ , nunc vix 4 gradus su-  
 “ perat, si nullus observationibus irreperit error. Ego quidem  $\iota\omega\chi\omega$ , et ad alias  
 “ aliorum locorum observationes provocho.

“ Sextum et ultimum nostri problematis solvendi epicheirema ab hydrographi-  
 “ câ nautarum chartâ desumitur, quam mirâ arte et solertiâ neoterici mathematici  
 “ adornarunt: inter quos longè clarissimus noster WRIGHTUS, de cujus lumine  
 “ STEVENUS, SNELLIUS, multique alii suas accenderunt faculas. Charta illius ad-  
 “ miniculo, naucleri triplici medio meridianorum differentias exquirunt. In pri-  
 “ mo dantur latitudinum differentia et rumbus, (ut loquuntur nautæ) in secundo  
 “ latitudinum differentia et distantia itineraria, in tertio altera latitudo, rumbus  
 “ et distantia.

“ Horum datorum primum  $\iota\omega\chi\omega$  est; facile enim et satis accuratè ubique ter-  
 “ rarum inveniri poterit latitudo. Secundum et tertium dubia sunt et inconsan-  
 “ tia. Rumbus enim  $\iota\omega\chi\omega$  ab acu magneticâ indicatus, corrigendus est per  
 “ declinationem magneticam, quæ in aliis locis alia est, et in eodem loco (si no-  
 “ vis observationibus credendum) non semper eadem. Distantia vero non solum  
 “ leucis aut miliaribus nobis cognoscenda, sed etiam ad gradus maximi circuli  
 “ terrestres reducenda. Hic autem nautarum conjecturas semper incertas mag-  
 “ gis adhuc turbant varii ventorum impetus et patentes oceanî fluxus.

“ Sex jam recensui problematis nostri epicheiremata, equibus quinque postero-  
 “ ra dubia et incerta dico, neque tamen prorsus rejicienda; suum enim habent  
 “ usum, et quæ non prosunt singula, multa juvant. Primum vero per eclipses  
 “ lunares facillimum et accuratissimum iterum pronuncio. Ilic verò oburgatio-  
 “ nibus non sunt digni mercatores et naucleri, qui in tot orbis terrarum periodis,  
 “ in tot oceanî  $\pi\epsilon\tau\epsilon\lambda\alpha\iota$  nullas aut paucas easque  $\pi\alpha\chi\upsilon\mu\epsilon\tau\epsilon$  factas eclipsium ob-  
 “ servationes trulerunt? Parum enim refert referre viam fuisse lunæ eclipsin in  
 “ sæcto Magellanico aut sinu Mexicano, in Mari Rubro aut Caspio, in Sinarum  
 “ regione

" regione aut insula Japonica, nisi simul addatur momenti hora, non *discrepant* per  
 " fallaces conjecturas æstimata, sed accuratissimè per centissimos characteres astro-  
 " nomicos designata.

" Sed quid culpo mercatores, qui solem et lunam non in cælo inter planetas,  
 " sed in subterraneis PLUTIS cryptis inter metalla querunt? Quid naucleros?  
 " qui præter instrumenta nautica nihil ferè sciunt aut curant amplius. Quid hos  
 " aut illos culpo? cum in tot literati orbis florentissimis academiis, in tanto hos  
 " thematicorum numero, vix unus aut alter, reperiat hanc facillimè et utilissimè  
 " eclipses observandi *regulam* sedulò versatus. Vos vero divinæ mathematicæ  
 " myllæ, macti estote, lavete et valete."

July 9, Sir CYRIL WYCHE president in the chair.

Mr HOOKE read a discourse concerning the form of PORSENNA's tomb, describ-  
 ed in PLINY. He also shewed a scheme of it different from that of Mr. GREAVES,  
 of which he was desired to leave a copy.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, July 2, 1684,\*  
 was read, containing some account of the spots seen in the sun at Oxford, June 27.

Mr. FLAMSTEAD agreed with this account, and said, that he doubted not of  
 its return in four days time.

The latter part of the discourse concerning natron was read.

A paper of Dr. PAPIN, concerning the softening of lignum vitæ in the  
 digester so as to receive an impression, was read; and the experiment was tried.  
 The paper was as follows.

" A piece of *lignum vite* being put with water in the digester, the fire was in-  
 " creased, till the drop of water would evaporate in two seconds: it was kept so  
 " for about half an hour, and afterwards, the fire being put out, the wood was  
 " found soft enough to receive easily an exact impression of a new three pence &  
 " though the *lignum vite* be the hardest wood, that can be found. If you boil the  
 " same wood in turpentine, or oil of turpentine instead of water, you cannot  
 " soften it."

A paper was communicated from Oxford concerning a digestive liquor turning  
 several meats into a chylly substance. The secretary was ordered to desire some  
 of the menstruum for a trial.

Some of the sea-water sweetened by the patentees was accidentally shewn and  
 tasted.

\* Letter-book, vol. ix. p. 266.

\* Register, vol. vi. p. 187.

It was proposed, that the Society might the next Wednesday adjourn their weekly meetings till toward the term.

July 16, at a meeting of the COUNCIL were present,

Mr. COLWALL  
Mr. HENSHAW  
Dr. CROUNE  
Dr. AGLIONBY  
Dr. LISTER

Dr. GALE  
Dr. TYSON  
Mr. HILL  
Mr. ASTON.

Mr. COLWALL took the oaths of supremacy and allegiance, and the oath of office as vice-president.

At a meeting of the SOCIETY on the same day, Mr. COLWALL vice-president in the chair.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford July 9, 1684<sup>b</sup>, was read, concerning the damage done to the pease and beans in Somersetshire by caterpillars. Mr. HENSHAW remarked, that the beans about London had suffered most where they grew near barley.

Dr. LISTER observed, that the caterpillar turned into a night moth; and that in the year 1666 he had given an account of one sort of them in a letter to Mr. OLDENBURG from Cambridgehire.

Mr. MUSGRAVE's letter likewise mentioned, that an account had been given to the Philosophical Society at Oxford of a design carried on by several of the most learned men in Somersetshire of writing the natural, civil, and ecclesiastical history of that county; the whole to be prosecuted by several hands, but the matter to be digested by some one of them; that Mr. PASCHAL, who lived near Bridgewater, was the chief undertaker; and that they would be glad of any assistance or direction from the Royal Society.

There was read a translation of a Dutch paper about finding the longitude by a twenty four hour-glass.

Mr. HOOKE remarked, that that sort of time-measurers had been found very uncertain by several trials; and therefore laid aside.

Dr. PAPIN observed, that he had found water in a clepsydra run faster in hot weather than in cold.

Mr. HOOKE read a farther explanation of his opinion about the galleys of the antients, which he confirmed by a figure engraved on TRAJAN's pillar representing the manner of rowing.

<sup>b</sup> Letter-book, Vol. ix. p. 260.

1684.]

Dr. PAPIN, in pursuit of the last experiment, softened cow's horn and tortoise-shell in the digester, and found the tortoise-shell to take a better impression than wood, and to be a fit material for taking off the impression of medals. His account of this was as follows:

"Having been commanded to try, whether softened wood would take an impression in relief, as well as a concave one; I have softened *liquum vite*, and with a seal, that is engraven very deep, I have given them a very exact impression, so that some small strokes in the deepest part of the seal, are printed upon the wood, and I have brought them to the Royal Society.

"Being about to try, how to make impressions in hard bodies, with the help of the digester, I would not leave it off, without making some experiments of the same kind upon cow's horn, and tortoise-shell: having then put some of them together in the digester with water, I increased the fire, till the drop of water would evaporate in two seconds, and left it so, for near a quarter of an hour. Then having put out the fire, and let the engine cool, I found, that tortoise-shell could very easily take a most exact impression of the same seal: so that I look upon tortoise-shell as one of the best materials to keep exact impressions of any medals, or engravings, that we have a mind to. The cow's horn was yet a great deal softer, and more swelled, and it could be folded like a piece of buff; so that I stand in some hopes, that either by a stronger boiling, or with some other *menstruum* more efficacious than water, these materials may be melted down quite, and be cast in a mold. I have brought all these things to the Royal Society, that they may be pleased to look upon them, and give me some directions upon that matter."

July 23, at a meeting of the COUNCIL were present,

Mr. HENSHAW  
Dr. GREW  
Dr. LISTER

Mr. COLWALL vice-president  
Mr. HILL  
Mr. FLAMSTEAD  
Mr. ASTON.

It was ordered, that the treasurer pay Dr. PAPIN one fourth of a year's salary, being seven pounds ten shillings:

That Mr. HOUGHTON be acquitted of his weekly payments for one half year, in consideration of his expenses about the Society's business:

That the person, who copies the Society's books, be paid fifteen pounds upon account till the books are finished: and

That the operator be paid half a year's salary from January 4 to July 14.

Monf. d'ABLANCOURT and Mr. MONSON were propofed and approved.

Upon a complaint of Mr. FLAMSTEAD, that he had been reflected upon by Mr. Hooke in the minutes of the Society, it was ordered, that a line should be drawn through the places complained of, and that there should be written on the fide, *cancelled by order of council*: and that the journal-book should be brought to the next meeting of the council, who should fee it done.

At a meeting of the SOCIETY on the fame day, Mr. COLWALL vice-president in the chair.

Mr. CLUVERUS gave an account in writing of the *astroscopia compendiarie* of Mont. HUYGENS, and of a paper tranfmitted from Dublin, containing a new manner of demonftrating Euclid.

Dr. PAPIN, after an endeavour to melt down cow's horn, and make it runy, which would not fucceed, found, that the powder or shavings of horn preffed together received a good impreffion (as appeared) and would make a kind of hard transparent paffeboard. His account of it was as follows<sup>a</sup>.

" In profecution of the experiment about softening cow's horn, I have endeavoured to melt it quite down, and to caft it in a mold; but I have not been able yet to effect it; although the fame horn reduced almoft to a powder hath been put three times in the digester, and kept there for near half an hour, with a heat, that will evaporate the drop of water in two feconds. The horn's particles will thereby swell very much, and stick to one another; but never run in a mold: nevertheless, we may from thence get almoft the fame advantage; because fuch particles may eafily be put in what form we please, and being well preffed, they will unite fo perfectly, that they will look like a continued body; and fo do the fame effect, as if they had been caft in a mold: as may be feen upon a farthing, which I have with me, part of which is overlaid with horns particles, fo well united, that they have endured polifhing, and look like a fine piece of tortoise-shell. I have alfo ufed fuch horn-shavings, as are thrown away by thofe, that make horn-combs, and having kept them in the digester, till the drop of water would evaporate in two feconds, I took away the fire; and I was furprized to fee, that the faid shavings did not feem to be swelled at all. Nevertheless, having preffed fome of them between two farthings, I found, that the shavings were fo well united, that they made a kind of a hard and tranfparent paffeboard; which I believe may be ufeful for the making of feveral difhes, tables, cabinets and other goods. I have brought fome fpecimens of it to the Royal Society, that they may be pleased to give me their directions."

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, July 22, 1684<sup>a</sup>, was read, concerning a fal gemme found in the Leeward Iflands and the coaft of Scotland; and Neapolitan black writing fand being magnetical.

<sup>a</sup> Register, vol. vi. p. 189.

<sup>a</sup> Letter-book, vol. ix. p. 269.

1684.]

The pneumatical engine being in good order, it was desired, that Dr. PAPIN would try some experiments, which require the air to be kept out for a long time.

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# ROYAL SOCIETY OF LONDON.

MONSIEUR FREMONT D'ARLANCOURT was proposed candidate as from Mr. BOYLE; and Mr. WILLIAM MONSON as from Dr. TYSON.

The Society adjourned themselves till towards Michaelmas term; at which time a summons was to be issued out by the president for their meeting.

During the Society's recess, Dr. PAPIN made the following experiments:

" July 30, 1684. Observations on a frog, and a fly in *vacuo*.

" Some trials were made upon frogs in *vacuo*, which lived well there: they did only seem a little uneasy, and their legs swam near the top of the water; but letting in the air, the same legs sunk. Some flies looked like dead in *vacuo*, but a while after the air was let in, they did recover very well; one of them shot out a long sting from his mouth; but as soon as the air was let in, the sting withdrew again.

" August 6, Observations on warm water, cold water, and warm beer in *vacuo*.

" Some warm water was put in *vacuo*, where it did boil very much; but cold water did only make a great many small bubbles; and beer swelled like froth over the brims of the glass, that contained it: but warm beer did boil with great violence to the top of the receiver, that was four or five inches above its surface.

" August 13, Observations on a pear in *vacuo*.

" A pear was shut up in *vacuo*, with intention to make some trials in the factitious air, that would come out from the said pear; but since that time the receiver holds still, and is not yet filled with factitious air.

" August 20, thermoscope with *vacua*.

" Mr. HENSHAW having propounded to try, whether a thermoscope, exhausted of air, with the liquor in it, exhausted of air too, might be sensible of cold and heat, as ordinary thermoscopes are; the thing was tried, and found, that the effect was not sensibly altered by the absence of the air.

" August 27, Experiment with cork in water.

" An experiment against positive levity was tried with good success: for we caused a cork to remain in the bottom of the water, nor could its levity raise it.

Register, Vol. vi. p. 190.

" C

" to the top of the water : but as soon as the water, that prest it underneath, **was**  
 " as high, as that, which did prest upon it, presently the cork was raised to the **top**  
 " of the water. We had an *apparatus* very fit for that experiment.

" *September 17.* A bottle full of air in an exhausted receiver.

" A square bottle full of air, and exactly shut up, was put under water in a  
 " great glass : and a great receiver being whelmed over it, the air was exhausted :  
 " and after some suction, the air included in the bottle under water had  
 " so much force, that notwithstanding the water, that was above it, it broke the  
 " bottle, and the glass containing the water, and the outward receiver, though  
 " every one of them was of a pretty good strength.

" *September 20.* Dr. PAPIN's experiment with the muscle of a man in *vacuo*,  
 " and a mercury gage to find the quantity of air produced.

" Dr. CROUNE sent the muscle of a man to be shut in a great receiver in *vacuo*,  
 " with a gage to know what quantity of air would be produced by the said mus-  
 " cle : but the Wednesday following there was found a crack at the top of the  
 " receiver, whereby the air had got in. The crack being stoppt, and the re-  
 " ceiver exhausted again, it hath been kept so ever since, and the mercury in the  
 " gage is not yet got to the height of ten inches : but because there is still some  
 " air produced, though very slowly, I intend to keep the same a little longer, till  
 " I see the gage will constantly keep the same height."

Mr. ASTON received likewise the minutes of the Dublin Society from June 9<sup>th</sup>  
 to July 24, 1684, as follows :

" *June 9, 1684* Mr. FOLEY read a discourse, which he calls *Computatio universalis*  
 "  *seu logica verum*, wherein he endeavours to bring the value of all things to a cer-  
 " tain standard, and to lay down some mathematical rules for good husbandry.

" Dr. MULLEN gave an account of what experiments he had made on the mi-  
 " neral waters last committed to him, producing likewise Bottles of two other  
 " waters lately discovered nigh Chappel-lzod within three miles of Dublin. The  
 " method, by which he proceeds in these experiments, was by infusing galls in the  
 " several mineral waters, and then impregnating common water with various salts,  
 " and in these infusing galls likewise, he observed, which of those artificial im-  
 " pregnations came nearest in colour to the colour resulting from the infusion of  
 " galls in the natural mineral waters : several of these experiments he shewed be-  
 " fore the company.

" Sir WILLIAM PETTY produced a paper containing a scheme of experiments  
 " for examining mineral waters : these are registered.

\* Letter-book, vol. ix. p. 261.

1684.]

" Mr. ASHE gave us at large his opinion of Mr. K.'s mesolabe, which he finds as mechanical as others propounded by several to this purpose. Likewise he proposed an ingenious method of his own, for dividing a line in extreme and mean proportion, much easier than EUCLID's and far shorter. This is registered.

" Mr. KING gave in three lines his opinion of Mr. K.'s mesolabe. A letter was read from Mr. K. containing some additions to be made to his mesolabe.

" June 16. At this meeting his Lordship the Bishop of Cork, lately returned from London, was pleased to give us his company, and to compliment us from the Royal Society, for which our thanks were returned to the said Society, and to his Lordship for the favour of the message. A letter from Mr. MUSEGRAVE was read, which contained the result of some experiments he had made by injecting water into the thorax of a dog, which recovered perfectly without any application or medicine. It brought us likewise the minutes of the Oxford Society from April 13 to May the 13th. These contained many curiosities, and particularly Dr. Plot's discourse of lamps, if not suddenly to be printed, was earnestly desired.

" Mr. ASHE produced some figured stones resembling petrified shells: these, we hear, are thought of late by some to be *lapides sui generis*.

" Mr. MOLYNEUX likewise produced some curiously figured rock-crystal, found near Catherlagh in a field; but how posited, the party that brought them, could not tell: they are hexagonal prisms determined at one end by an hexagonal pyramid, as curiously edged, as if cut by art; on the other end they seem to determine in a roof, as if fixt thereby to another stone, for this end is opaque, whitish and ragged.

" He also presented a stony substance bigger than a large white pea, of an irregular shape, and yellowish substance: of these stones there is a person of quality of a very sickly constitution in this town, that has voided at several times above an hundred by siege, and several as big as the end of ones finger.

" SCHELHAMMER'S book *de Auditu* was also presented by him, and an account thereof promised at our next meeting.

" There were two bottles of Clonuf Spaw-water brought to us from Mr. KING; but these having been kept from the fountain a week, had lost their mineral taste.

" June 23. At the desire of his Lordship the Bishop of Corke, Mr. MOLYNEUX did again expose a dissected water-newt, and shewed therein the circulation of the blood: he also gave an account of SCHELHAMMER'S book *de Auditu*.

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" A let-

" A letter was read from Mr. K. relating farther to his mesolabe, and some other propositions under his consideration: therein also he proposed this problem, *Invenire quatuor figuras planas ordinatas continue proportionales, quæ singule inter se sint heterogeneæ et isoperimeiræ, vel quæ singule inter se sint heterogeneæ et isodiametrix (id est, eadem circulo circumscriptæ)* Mr. ASHE and Mr. KING undertook to do something therein.

" A letter was read from Mr. KING, dated from Clonuf waters, therewith he sent us a bottle of Edenderry water, as also some of the sediments of both Clonuf and Edenderry waters dried to powder, exactly resembling *rubigo ferri*: these will not apply to the magnet, but it was moved, that they should be calcined, and then tried again with the magnet. Mr. MOLYNEUX undertook that task. Mr. KING read an accurate and ingenious account of Clonuf waters according to the experiments Sir WILLIAM PETTY proposed to be tried on mineral waters.

" June 30. Mr. ASHE presented some formed stones, found in the country of Westmeath: likewise he produced the calculation of the next solar eclipse from several tables.

" Mr. FOLEY presented also a formed stone found in the college chapel-yard, and thereon read an ingenious discourse, wherein he summed up the opinions of others concerning these formations, and was very particular in giving an account of Dr. PLOT's sentiments, adding withal some observations and thoughts of his own.

" Upon occasion of the *Philosophical Transactions* of January last, num. 155. and the account therein given by the ingenious and learned Dr. SMITH of the Turks, and of their profound ignorance in all polite literature, it was moved by Mr. MOLYNEUX, that this may be compared with what Sir GEORGE WHEELER relates of them in his travels, pag. 199 and 200, as being informed thereon in by one Mr. WATSON, a Scotchman, whose credit, upon the learned doctor's account, was something questioned. Dr. SMITH's thoughts hereon are desired.

" July 7. Mr. ASHE and Mr. MOLYNEUX gave an account of their observation of the last solar eclipse: the day being much overcast hindered them from taking any thing accurately, but towards the middle of the eclipse they had a short view of the sun, as much as to estimate, that about eight digits were covered: at the ending also they had a faint view thereof, and assigned its end at h. 3. 56 min. p. m.

" A letter was read from his Lordship, the Bishop of Fernes, wherein his Lordship informs us of these particulars, that he will suddenly transmit to us the queries relating to the magnet: that he has had a long time in his thoughts a contrivance to make one single candle thoroughly enlighten any the largest room, yea, even church itself, and that uniformly, and as soon as he can visit the glass-house, he hopes to effect it: that the rarity of insects in the country " he

1684.]  
 " he is in, especially of those, that are uncommon, and of curious fies, has his  
 " shert hindered him from completing the history of the generation of those ani-  
 " mals, which he has had a while under his thoughts: that lately he found a nest  
 " of fifty full grown bruthi on a plum-tree: that the country about him affords  
 " a curious gravel, delicately mixt with spar, which looks very pleasantly on the  
 " rolled walks of gardens, when the sun shines on them: that the earth all there-  
 " abouts is mixt with the same sort of spar.

" Sir WILLIAM PETTY gave an account of a commodious land carriage he  
 " had lately contriv'd, which, drawn by an ordinary horse of 10*l*. price, carries  
 " one that sits in it with ease, and a driver on the coach-box, with a portman-  
 " teau of twenty or thirty pounds weight, twenty five or thirty miles fusth a day:  
 " this carriage is likewise very easy for the traveller, and far more secure than any  
 " coach, not being overturnable by any height, on which the wheels can possibly  
 " move. It is likewise contriv'd to be drawn about the streets by one man with  
 " one in it, and that with less pains than one of the sedan bearers does undergo.  
 " It is very cheap, an ordinary one not costing above six or seven pounds, the four  
 " wheels being above half the money.

" Mr. MOLYNEUX explained a contrivance of his own for demonstrating to  
 " the eye the figure, wherein projects do move.

" Mr. ASHE having in his possession one of Sir SAMUEL MORELAND's speak-  
 " ing trumpets, it was moved by Sir WILLIAM PETTY, that a striking watch  
 " may be put into it, and tried how much farther than ordinary it would trans-  
 " mit its sound.

" Next Monday being the Comitia Philologica in the college towards the  
 " commencement on the day following, adjourn'd till Monday, July 21.

" July 21. A letter was read from Mr MUSGRAVE, containing the minutes  
 " of the Oxford Society from May the 2<sup>d</sup> to June the 24<sup>th</sup>, inclusive; as  
 " also some experiments of his own on the jughars of a dog. In the former it  
 " being observ'd by Dr. PLOT, that the natron, he has, did not melt all the win-  
 " ter, or thaw, but about the time of the overflowing of the river Nile; Dr. HUN-  
 " TINGTON assures us, that some natron, he keeps, did melt in the last winter.

" A letter from Mr. KINO was read containing some experiments made by  
 " him and Dr. DUN on the mineral waters of Clonul; among others it being  
 " hinted herein, that the sediment of these waters, with oak leaves, yield a good  
 " black dye to cloths, &c. It was order'd, that some experiments should be tried  
 " hereby to help our dying black, wherein we are so deficient in this kingdom;  
 " and also, perhaps, the dying with these waters may prevent the rottenness of  
 " black, proceeding from the corrosiveness of the vitriol. Mr. PLEYDALL was  
 " pleas'd to take upon him this province.

" Mr. STANLEY read a discourse about the motion of water.

" Mr.

" Mr. ASHE produced some formed stones, almost exactly spherical: these are found in great quantity nigh Londonderry, in a bed of sandy earth: there are of them from a quarter of an inch to two inches diameter, they are very heavy and gritty, of a light brown colour, and in the late rebellion, the inhabitants thereabouts used them for bullets.

" Ordered, that the thanks of this Society be returned to Mr. SMITH for the honour he did us in the public act in the college on this lemma *paradoxon vetus Ægyptiacum, quod sol nonnunquam oritur in occidente*. Demonstratur se Societate ad promovendam scientiam naturalem Dublinii nuper instituta."

Octob. 29. The Society resumed their meetings, having been summoned by Mr. COLWALL vice-president.

The secretary presented in the name of Mr. BOYLE, a book of his, intitled, *Experiments and Considerations about the Porosity of Bodies, in two Essays*; of which Dr. AGLIONBY promised to give an account.

A book was presented by Mons. JUSTEL, intitled, *Traité du nivellement par Mens.* PICARDI *mis en lumière par Mons. DE LA HIRE*: of which Mr. FLAMSTEED promised to give an account.

The secretary having, during the recess of the Society, received by Dr MARCK as from the hands of the resident of the Elector of Brandenburg, a small book in High Dutch, 'called the chemical touchstone of J. KUNCKEL *de acido & urinoso Sale calido & frigido contra D. VOIGHT spiritum vini vindicatum*', dedicated to the Society; the book was immediately put into the hands of Mr. BOYLE to be perused by him, who now transmitted an abstract of it in Latin.

The same book having also been seen by Dr. SLARE he gave an account of it in English; part of which was read, and the rest reserved for the next meeting.

A letter in Latin was read, directed to Dr. GREW, as secretary of the Society from Dr. SOLOMON REISELIUS, chief physician to the Duke of Wirtemberg, dated at Stutgard, July 25, 1684, in which he complained, that he had three times before this written to the Society, but had received no answer; and therefore now desired to have a correspondence with, and to present to the Society a book of his, intitled, *Inventum rarum et hydrostaticis omnibus balneis impossibile*: which was delivered to Mr. HOOKE to be perused.

Sir JOSEPH WILLIAMSON, who was mentioned to have been written to when president, and the secretaries present, affirmed, that they had seen no other of Dr. REISELIUS's letters.

Mr. ASTON was ordered to write an answer to them.

<sup>a</sup> A translation of it printed in the *Philos. Transact.* N°. 168. p. 896. for Feb. 1684

<sup>b</sup> Letter-books, vol. ix. p. 270.

Three letters of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, September 10<sup>th</sup>, Sept. 18<sup>th</sup>, and Octob. 10<sup>th</sup>, 1684, were read, mentioning a woman troubled with epileptical fits, which returned every Sunday: a new instrument for taking an account of the increase and decrease of oil of vitriol exposed to the air; that the late eclipse of the sun began at Tredagh in Ireland, latitude 43 deg. 40 min. at 1 h. 37 min. 30 sec. and ended at 3 h. 56 min. 20 sec. Some observations of Dr. TURBEVILLE relating to the eyes\*.

An account was read of some experiments made by Dr. PAPIN at Gresham-college during the Society's recess†.

Dr. PAPIN shewed, how a pipe being stopped with an apple, and kept in *vacuo*, the apple will not stir; but as soon as the air is let into the receiver, the apple being prest upon by the air will be driven into the pipe with great violence. His account of it was as follows‡:

"It hath been tried long ago by the hon. Mr. BOYLE, that several effects ascribed to suction do merely proceed from the pressure of the air, because, if you draw the plug of a pump in *vacuo*, it will suck no water: and the water will not ascend into the pump, but when the external air comes to press upon it. I have therefore thought it would not be amiss to confirm the same thing by another experiment; that is to stop a pipe with an apple, and draw the air out of the said pipe: it will come to pass, that as long as the pipe is in an exhausted receiver, the apple will not stir: but as soon as the air is let in to press upon the apple, it will be driven into the pipe with a great violence."

He promised to shew at the next meeting how the quicksilver may be made to rise above the ordinary counterpoise.

Next, s. Mr. RICHARD WALLER presented to the Society his English translation from the Italian of *Essays of natural Experiments made in the Academy del Cimento under the Protection of the most serene Prince, Leopold of Tuscany*: which book was put into the hands of Dr. PAPIN to peruse, and see what improvements or other trials might be made upon the subjects there treated of.

The secretary read the other part of Dr. SLARE's account of Monsr. KUNCKEL's book, *De acido & urinae & Sale calido et frigido*, &c.

The Society considering, that Mr. BOYLE had favoured them with an abstract of the same book, ordered the secretary to thank him, and to desire his opinion about the controversy§.

A let-

\* Letter-book, vol. ix. p. 270.

† Ibid. p. 272.

‡ His letter, dated Octob. 5. 1684, is printed in the *Philos. Transact.* No. 164. p. 737.

§ See above.

¶ Register, vol. vi. p. 192.

¶ Mr. BOYLE's answer to Mr. ASTON, according to a minute of the latter, was to this effect: that

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, Novemb. 27. 1684\*, was recd, mentioning a viscous flegm found in a shell-fish of the Severn; which being laid on linnen first turns it greenish, afterwards by lying in the sun it becomes of a deep red. This red grows somewhat lighter upon the first washing, but afterwards does not sensibly decay.

Mr. MUSGRAVE having offered to send up the patterns of these colours, it was desired, that he would do it, and transmit such farther accounts thereof as should come to his hands.

Dr. PAPIN made the quicksilver stand higher than the poise, by clearing it of the air: and wetting it with water. His account of this experiment was as follows†.

“ Having been commanded to make the experiment of the mercury purged of air, that remains suspended in a tube higher than the air can sustain it, I have found it here a great deal more difficult, than I have found it at Venice, which I cannot ascribe but to the foulness of the mercury, that I have used here. I included it *in vacuo* on Thursday last, and I could never get it purged enough till Monday, and even that day (though it could remain suspended a little higher than the air could sustain it in a tube half full of water and half of mercury) yet it fell before the receiver that covered it was quite empty of air: but at Venice in twenty four hours time, mercury might be so well purged, that a tube quite full of it did remain so, not only till the air was quite drawn out of the receiver; but even by great shakings I could hardly make it fall. I can shew at present, what may be done with foul mercury: and if the Royal Society bids me to try the same thing with better mercury, and with variety of other circumstances, that will perhaps give some light to the odd experiment, the cause of which is not yet known enough, although it is many years since the hon. Mr. BOYLE hath made it for the first time.”

Dr. PAPIN was hereupon desired to provide a long glass, and try the greatest height, which he could make the quicksilver stand at for the next meeting.

Mr. PAGET having been desired, May 7. to sort the mathematical papers of Mr. THOMAS MERRY, which had been given to the Society, he now returned the said papers. which were put into Mr. PERRY's hands with the catalogue, to be kept in the library: part of them were thought fit to be bound up. The catalogue was as follows:

that Monsieur KENNEL's book being written in High Dutch, which he did not understand, he had used an interpreter, whose mistaking a word might be of consequence; and that therefore he should determine nothing, till the Society had not been used to judge in these cases:

that they were now making experiments, and were not come so far as to frame systems; that he was glad to see a controversy managed with so many good experiments, and by so able men.

† Letter-book, vol. ix. p. 274.

† Register, vol. vi. p. 123.

TRACTATUS

## TRACTATUS.

1. GELLIBRANDI (ut videtur) *Problema pro Longitudine invenienda, cujus datur Latitudo et Altitudo affixe momento culminationis Lunc.*
- Ad calcem habetur *Epistola HENRICI BRIGGII ad Longomontanum.*
2. *Annotationes ejusdem anonymi in Copernici Revolutiones. Videtur hoc esse manuscriptum BRIGGII.*
3. BRIGGII *notitia quedam circa Constructiones borelogiorum in Area & Edibus Mercurijs OXON.*
4. GELLIBRANDI *Investigatio differentie Longitudinis Londinum inter et Charle-toum in Fretis HUDSONII ex Observationibus THOMÆ JAMES habitis è tribus fixa-torum altitudinibus et Luna culminante. Tractatus perfectus.*
5. *Ejusdem integra scriptum Doctrina ex mente TYCHONIS BRAHE.*
6. *Ejusdem Collectanea quedam in eandem materiam.*
7. BRIGGII (ut videtur) *Tentamina quedam in Eutocianis numeros Cyclometricos.*
8. *Epistola HENRICI BRIGGII ad Longomontanum, anno 1627.*
9. *Tempus vite &c &c investigare.*
10. *Annotata (pote) GELLIBRANDI in luna appulsam et lucidam Pleiadum, et ejusdem congruentiam cum theoriâ Tychonicâ, et discrepantia cum aliâ.*
11. *Catalogus Librorum mathematicorum novissimè editorum a JOHANNÆ COLLINS.*

## Treatises of Mr. MERRY'S own.

12. *Trigonometria Ougbredianna plurimis locis aucta & explicata.*
13. *Inventio & Demonstratio regularum HUDSONII de radicalibus Equationum.*
14. *Schediasmata in libros annuales Elementorum EUCLIDIS novâ methodo demon-strandi.*
15. *Casuum trianguli reſtangi Disquisitio analytica.*
16. *Problemata quedam de fortibus & variis Electionibus.*
17. *Miscellanea.*

Nec. 12. At a meeting of the COUNCIL were present,

Sir CHRISTOPHER WREN  
Sir JOHN HOSKYNs  
Mr. HILL  
Dr. LISTER

Dr. AGLONBY  
Mr. FLAMSTEAD  
Mr. HALLEY  
Mr. ASTON.

Mr. COLWALL the vice-president being sick, Sir CHRISTOPHER WREN and Sir JOHN HOSKYNs were severally sworn vice-presidents, according to a deputa-tion of the president under his hand then produced by the secretary, having like-wise the oaths of allegiance and supremacy, &c. then administered to them.

There were proposed as candidates, and approved of, Mr. JOHN BEAUMONT, Mr. CHARLTON, Mr. TANCRED ROBINSON, Dr. WILLIAM BRIGGS, and Mr. ALEXANDER PITFIELD.

At a meeting of the SOCIETY on the same day, Sir CHRISTOPHER WREN, vice-president in the chair.

Monf.

Monf. FREMONT D'ARLANCOURT was elected a fellow.

Mr. WILLIAM MONSON was likewise elected.

There were propofed candidates

Mr. THOMAS BAKER by Mr. PAGET.

Mr. RICHARD BEAUMONT

Dr. TANCRED ROBINSON

Mr. WILLIAM CHARLETON

Dr. WILLIAM BRIGGS

Mr. ALEXANDER PITFIELD by Mr. RICHARD WALLER.

} by Dr. LISTER.

A piece of Afbestus linnen having been brought from China by Mr. NICHOLAS WAITE, merchant of London, he gave the Society a proof of its refifting the fire, as he had formerly done to fome of the members.

The linnen was meafured, being in length nine inches to the taffels; the taffels at each end being three inches more: the breadth was full half a foot.

The weight of the linnen before it was put into the fire was an ounce, three drachms and eighteen grains.

The linnen being put into a clear charcoal fire, continued in it red hot for feveral minutes. Upon its being taken out of the fire, though the linnen was then red-hot, it did not confume a piece of paper, upon which it was laid. It was preffently cool; and upon weighing, it was found to have diminiſhed a drachm and fix grains, or a tenth part and almoſt a quarter.

A paper was read containing ſome obſervations of Dr. SLARE upon reading Monf. KUNCKEL's book.

Dr. SLARE then ſhewed three of the experiments mentioned in the book, to prove the acidity of ſpirit of wine.

1. That ſpirit of wine and milk being mixt in about equal proportions coagulates. This was found true.

2. That ſpirit of wine having a little water dropt into it grows hot. This appears diſtinctly; for a thermometer being put into plain ſpirit of wine grew preffently higher: but being at a ſtand, it was raiſed an inch higher by mixing a little water with the ſpirit of wine, in which it ſtood.

3. That ſyrup of violets having ſpirit of wine dropt in it, turned green. This did not appear well by candle light, and therefore was left to Dr. PAPIN to examine.

Dr. SLARE alſo took notice of ſeveral curious and uncommon operations mentioned by Dr. KUNCKEL.

Mr.

Mr. ASTON reported, that Mr. BOYLE was not willing to pass any judgment on MONT. KUNCKEL's book: that he seemed glad to see controversies managed by experiments: that the Society had been hitherto making experiments; till they had done with which, he thought they would not prescribe to others.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, November 8, 1684, was read, transmitting one from Mr. WILLIAM COLL of Britol to Dr. Plot, dated at Minehead, October 17, 1684, concerning the liquor of a fish staining first green, which afterwards by heat becomes a purple. Mr. COLL's letter was as follows:

"Among the many observations I have made, I here send you inclosed two rays, which is one of the greatest rarities I have met withal. About a month since here was a lady of my acquaintance arrived from Ireland, bound to her uncle, Sir ROBERT SOUTHWELL, at King's Weiton, who informed me, that many ladies and persons of quality do often find to a port town (as I remember Cork) to have their handkerchiefs and other linen marked by one, who understands how to do it. She told me, that it was with a small shell-fish, in which is found a humour, that being taken out whilst living, and with a pen or other wise any linen marked with it would yield such a tincture, as never to decay by often washing. Upon which I made experiments of several sorts, found on the shores here (St. Donnets) and tried several parts of them, but could make nothing of it, thinking the matter to lie in those parts, that were of either black, yellow, or reddish colour; but at length, to my admiration, found it in a little white humour lying inclosed in a small cavity covered with a thin skin, which is of a substance like unto white viscous phlegm, but so thick and stimy, that it would not, without difficulty, be laid on with a pen; but with a small sharp pointed pencil, made of horse-hair, I could make out of one of the biggest six or eight large letters. At its laying out it is white, within a minute it turns greenish, and so grows deeper; then put out a little while in the sun turns of a deep red; as that rag, in which are the two first letters of yours and my name, and which hath not been washed since I wrote on it. The other, nullius, &c. hath been washed in scalding water. After you have considered them both, you may cause the first to be boiled and washed with soap, and yet it will retain the colour, first lighter, but never after to decay by often washing. I have marked some handkerchiefs and other fine linen, and find it fairer than on this coarse (being what I could get at present.) At my return, Gon willing, to Britol, I will send you some of the shells the biggest and smallest, and a more particular account of it, and in what part it lies. I have several other things, which I shall send you by carrier, among them some of the figured stones found plentifully nigh St. Donnets, which are somewhat like the nautilus, and of Oxfordshire; I am sure so much unlike either of the kinds of the nautilus, which that they were never such shells, and then they must be of a species lost, which can never be without dishonour to the great Creator of all. I have seen above twenty of them in a solid very hard rock, (appearing half out of the superficies)

" within the breadth of two feet. But I could not by masons hired get them out whole, but on the sides of the cliff, being climbed by them, they between the shelves of rocks in a marly earth digged many whole ones out for me, some of which I shall send you. I have not room to communicate the least part of my observations here, and in Wales. One thing I forget of the shells, that the aforesaid tincture smells so grievously fetid, the other parts of the fish not so, that it will not come out till several washings, and my fingers have retained the smell after washing with soap, &c."

Several patterns of the staining upon linen-rags and papers were shewn, both green and purple, and lighter coloured, very well agreeing with the account given of them.

It was said, that Mr. BOYLE took the shell-fish to be the limpet: and Dr. LISTER remarked, that it was some of the atramentous kinds, of which formerly use had been made in writing, whereby counterfeiting was rendered very difficult.

Dr. PAPIN shewed again the experiments of the last meeting.

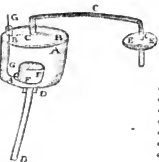
He made likewise the following report concerning the experiments of the academy *Del Cimento* referred to him\*:

" Not being able to give the due praise to the book of experiments of the Florentine academy, nor to its translation, that hath been put in my hands, I will quite forbear to say any thing to that purpose: but in obedience to the order of the Society, I shall only observe some particulars, that might be carried farther, by help of better instruments, which could not be got by the learned members of that academy. The first of these particulars begins page 22, where is described a very good and ingenious way to discover, how far the air may be expanded, before it will cease to make a sensible effect by its elasticity: and by three several trials they find, that when the air is expanded to a space about 200 times greater than its ordinary dilatation, it will no more be sensibly elastic. Nevertheless I have a rule to calculate in the Torricellian experiment, how much the mercury will be depressed, by the elasticity of any quantity of air, that may be left at the top of the glass-pipe: which rule I have found true, in so many repeated trials, that I don't question but it will hold also, in the present case: and by that rule I find, that in a baroscope but fifty inches long, and of an equal bigness, some quantity of air being left at the top of the mercury, and expanded 200 times more than usually it is, such air must depress the mercury near a sixth of an inch below its due height, which is a difference sensible enough, and should have been observed by such nice experimenters as those gentlemen were. This makes me believe, that the baroscope, which was their standard in this experiment, had also some air at the top of the mercury, and so they could not with it discover, whether the mercury kept its due height in another tube: and indeed it hath been tried in the Society last summer, that ordinary baroscopes are subject to heat and cold, which shews, that there is some

\* Register, vol. vi. p. 174.

" air at the top of them. Therefore to perform the design of the Florentine academy, it is necessary to make the Torricellian experiment, so that there may be no air above the mercury in the glass tube: and I have thought of a way fit for that purpose, which I do the less scruple to submit to the examination of the Royal Society, because I believe by the same way, the aforementioned defect of ordinary baroscopes may be prevented.

- " AA is a receiver with his great aperture upwards.
- " BB is a plate applied to the said aperture to shut it exactly.
- " CCC is a pipe loderred to a hole in the said plate, and reaching to the pneumatic engine, so that through this pipe the receiver AA may be exhausted.
- " DD is a glass-pipe for a baroscope having its aperture upwards, and cemented in a hole at the bottom of the receiver AA.
- " EE is the plate of the pneumatic engine.
- " FF is a vessel full of mercury, included in the receiver AA.
- " GG is a wire passing through the hole in the plate BB, without giving any access to the outward air, and reaching to a hook fastened to the vessel FF, so that lifting up the wire, the vessel must incline on one side, and spill its mercury.



" Supposing then that the receiver AA hath been kept exhausted of air for a good while, that all the particles of air lurking in the mercury FF, or sticking to the sides of the tube DD, may have time to get away. It is plain that drawing up the wire GG, the mercury being spill out of the vessel FF, must fall into the pipe DD, and so fill it exactly without any air intermixed with it: so it remains only to be careful not to include any bubble of air, when we stop the tube with our fingers, for to merit it, and make the Torricellian experiment: and by that means, I don't question, but we may have a baroscope not at all subject to heat and cold, and fit to be a true standard in making the experiment attempted in the Florentine academy. Thus much I do submit to the judgment of the Royal Society, and being so tedious upon this subject, I shall keep the rest of the book for another day."

Novemb. 19. Sir JOHN HOSKINS vice-president in the chair.

Dr. LISTER presented his edition of JOHANNES GOEDARTIUS de Insectis, with his own notes and an appendix. *Ad historiam animalium Angliæ*, lately printed.

There was also a paper read, giving an account of this new edition and its differences from the English, as 1. That it contains another edition of the appendix to the history of the animals of England, to which are added two new plates.

U u 2

with a new description of the genus of the *musculi fluctuantes* and the pholas kind.  
2. That there are subjoined four tables about the beetle kind in England, without any description.

Dr. PLOT presented his book intitled *Tentamen philosophicum de Origine fontium*, which was recommended to be perused.

Mr. RICHARD BEAUMONT, Mr. THOMAS BAKER, Mr. ALEXANDER PITFIELD, Mr. TANCRED ROBINSON were elected fellows.

Dr. PAPIN shewed the quicksilver standing at forty two inches by the help of water, and very subject to fall.

He reported the success of his experiments made in conjunction with Dr. KING, of the effects of spirit of wine mixed with the syrup of violets, his account being as follows :

" Having been commanded to give an account of the effect of spirit of wine mixed with syrup of violets, I carried the vial to Dr. KING, that did not perceive any other colour but that of the syrup much diluted. But for greater security, he took some parcels of it, and having tried them with spirit of vitriol, he made a very fine purple; and with salt of tartar he made a very fine green; so that it was plain enough, that the spirit of wine doth not alter the colour, but only dilutes it. Upon this occasion the doctor would try the same mixture with other preparations, not so common as the two aforementioned, and he found, that tincture of antimony makes a more intense green than any salt :

" Tincture of steel makes a dark green.  
" A strong tincture of tartar doth but dilute like spirit of wine.  
" Salt of steel doth nothing.  
" Volatile salts of urine, hartshorn, or sal armoniac turn it green."

A committee of five persons not of the council was nominated and elected by ballot, according to the statute, to meet that week for auditing the treasurer's accounts, viz. Mr. CLUVERUS, Mr. HOOKE, Mr. RICHARD WALLER, Mr. PERRY, and Mr. LODWICK, or any three of them.

Dr. PAPIN, upon occasion of the Florentine experiments, pag. 22, proposed a way for filling a barometer so, as to be sure there will be no air left on the top of it. The manner being well considered of in the draught, he was desired to make trial of it at the next meeting.

Dr. PLOT read part of a letter, which he had received from Mr. COLLE of Bristol, dated at Minehead, October 31, 1684, concerning the tincture of the shell-fish before mentioned, and mentioning, that the shells were to be gathered at neap tides, after which they lived a week or more in sea-water: that the colour at neap

\* Register, vol. ii. p. 196.

\* Ibid. p. 250.

is white, and in less than two minutes turns greenish, and then more green as soon as it is dry, but being carried out into the sun, as it begins to grow green, that colour presently comes to its height, and in two or three minutes more becomes of a dark red, and so remains, if kept from the sun or fire.

Sir CHRISTOPHER WREN observed, that calicoes stained in the Indies have a fish smell, and he supposed, that being a cold die, it might be capable of great changes by salts.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, Nov. 7, 1684, and accompanied with an account of a large glandulous substance growing between the pericardium and heart of an ox, as it had been examined at a meeting of the Philosophical Society at Oxford.

Dr. PLOT gave the following account of an experiment made at Oxford. Upon the fifth instant the operator being about to prepare tartarum vitriolatum, upon pouring the dephlegmed spirit of Vitriol upon the tartar, in the conflict between them was conceived a visible flame; and in the coagulum afterwards there continued a light much like those of the phosphori, for a great part of that evening; and if held to the fire, so as to be a little excited for two days after, some little star-like brightness would appear up and down, here and there, in the coagulum.

It was desired, that Dr. PLOT would charge himself to be curator for the preceding experiment, and take to his assistance Dr. SLARE and Dr. PAPIN, if their time permitted.

November 26, Dr. KING presented to the Society the model of a stone taken out of the bladder of Mr. ADONIRAM BYFIELD, which he had caused to be made in plaster of Paris.

The stone itself, when taken out of the body, weighed thirty two ounces. It was remarkable, that Mr. BYFIELD had no pain till two hours before he died.

There was part of a letter of professor JOHN CHRISTOPHER STURMIUS to Mr. HAAK\* concerning Mr. HALLEY's hypothesis of four magnetical poles of the globe of the earth, which he explained, as if the influxes at the north and south poles met in the earth like two contrary winds, whereby each influx is divided into two branches.

Dr PLOT read the following letter to himself from Mr. CHARLES LEIGH, who was then in Lancashire with a design of writing the natural history of that country†:

"After the tedious fatigues of a cold, but satisfactory journey in the north, I met with both yours at Preston, and shall, according to your desire, give you an account of some curiosities, which I have observed there; but I must conclude."

\* Letter-book, vol. ix. p. 296.

† Ibid. It is printed in the *Philos. Transact.*

Nº. 167. p. 860. for January 1683; 144. p. 100.

Letter-book, vol. ix. p. 297.

554 the descriptions of them, which I have hence sent you, are not so full as I could  
 with them, being forced out of the northern islands by the extremity of frost  
 and snow. I have, according to my promise, taken notice of the generation of  
 barnacles, the manner of which, as 'tis commonly believed, I look upon to be  
 very erroneous. It is supposed by seamen, that when any ships come from the  
 Indies, their vessels produce some unctuous matter, which is the cause of barn-  
 acles, for they always observe as they come from thence, that an infinite num-  
 ber of these stick to the sides of their ships. But were this a sufficient argument  
 to prove the generation of barnacles after this manner, they might as well infer,  
 that oysters and muscles are generated after the same manner; for at the same  
 time that they saw those, which they term barnacles, sticking to their ships, there  
 were at the same time likewise oysters and muscles hanging at it. That there-  
 fore, which they call a barnacle, I look upon to be a shell-fish, and not a bird,  
 for these reasons, 1st, Because, when not covered with water, they immediately  
 die. 2dly, The flesh and smell of them is exactly like that of fishes. 3dly,  
 That, which resembles the head and neck of a barnacle, and which by the sea-  
 men is looked upon to be such, is, I am well satisfied, (because it is not joined  
 to the body) not any such thing. 4thly, Those, which by them are esteemed  
 wings, are only little claws wound up in spiral lines. And lastly, there cannot  
 any seaman say, that he ever saw any of these turn into any kind of bird, and  
 swim in the water; though some do confidently affirm, that they have seen them  
 with feathers coloured like those of the barnacles: as for my part, I have not yet  
 seen any such thing, and shall therefore, till I do see it, think they have better fan-  
 cies than judgments, that affirm it. We have this winter had great number of  
 caterpillars, in which I have observed this remarkable, and I think new; upon  
 the cabbages I saw a great number of small eggs covered with a yellow cotton:  
 these in a few days time did all of them turn into young caterpillars; the young  
 caterpillars fastened upon the old one, and in ten little holes above the feet  
 crept within her, insomuch that out of one old caterpillar I took forty two  
 young ones. I do therefore think, that the old caterpillars are destroyed by their  
 young ones, for wherever I found a nest of these, I found an old one dead by them.

" In several apples this winter, though they seem to be as sound as ever I saw  
 them in my life, yet in the pippins I have very often found a maggot as large  
 as the pippin itself, and the skin of the pippin intirely whole. If all insects  
 come from an egg, I cannot imagine how this came there, unless the egg of a  
 maggot be so small, that it can rise along with the juice, that nourishes the pippin.  
 I shall now give you an account of some things in the mineral kingdom: we  
 have a white marl, which lies about a yard under the soil, and in this an infi-  
 nite number of small shells: how these shells should come from any other but  
 the plastic nature of the earth, I cannot imagine, this lying so remote from ei-  
 ther river or sea. We have likewise fullers earth, tobacco-pipe clay, potters  
 clay, alabaster, talc, plaister of Paris, yellow oker, and a black chalk, which, if  
 put into water, hisses more than quick lime. I have a piece of chalk by me,  
 which was taken out of the bladder of a hog: it is shaped like a muscle-shell and  
 is about the same bigness: under this chalk there are two perfect shells as large as  
 the chalk did together by a ligament. We have rock alum, vitriol, sulphur,

“diamonds, which are cast up by the moles in April; these are not to be discovered though you dig never so deep. We have silver ore, lead ore, iron ore, copper, and some copper-ore we have in our coal-pits. We have waters impregnated with the natron, others from iron, some with asphaltum and iron, which have done very wonderful cures. Some we have seen like tincture of sulphur, some which are a little brackish, and vomit extremely, some which by falling upon wood turns into a substance, that rings like a bell. We have two springs, which petrify, and a water, which comes from white marl, that is lighter than any other by two ounces in a quart. We have likewise a water, that did not freeze in the great frost, though a standing water; near the last it is farther remarkable, that there is an ascent in the form of a pyramid, upon which there is always so calm an air, that though there be winds quite round about it, yet you may stand with a lighted candle on it. We have likewise very great varieties in stones, plants, shells, fishes, and accidents, which have here happened to men and women: it would be too tedious to insert them in this; you may therefore expect to hear farther of them in my next.”

Mr. MUSGRAVE shewed the copy of a Runic inscription, which had been found on a font at Bridekerke in Cumberland.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Dublin, Octob. 9, 1684, was read, describing the Connaught worm, said to be the only poisonous animal, which is bred in Ireland. But, as Mr. MOLYNEUX himself supposed it, appeared from the figure to be nothing else than a caterpillar very like a silk-worm.

Dr. LISTER observed, that the remedy used by the Irish was much like that against the nurthro or field-mice: and that naked caterpillars are seldom poisonous, but that the hairy ones often are.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, Nov. 13, 1684, was read, mentioning cubical stones of the golden pyrites, found plentifully at St. David's in Pembroke-shire, as at many other places.

This letter contained also some observations made in the dissection of a woman at Reading; that a branched stone was found in the left kidney, and in the right kidney another stone of about the bigness of a pigeon's egg, and sixteen or seventeen more like pease or small beans.

Upon occasion of this and chalk found in a hog's bladder, Dr. LISTER took notice, that Dr. PEARSE had found a turbinated stone in the kidney of a woman.

Dr. PAPIN communicated the following remarks on the Florentine experiments:

“Pag. 43. The book of the Florentine academy speaks of several experiments. It is printed in the *Philos. Transact.* N<sup>o</sup>. 108. p. 276. 1 letter-book, vol. ix. p. 309. 1 Register, vol. vi. p. 297.

“that

" that have been all unsuccessful, for finding whether, or not, amber will attract in *vacuo* : but I don't question, but by help of the pneumatic engine, the experiment might be done very well : and the hon. Mr. BOYLE says, that he has found already, that amber is electric in *vacuo*, as well as in the open air.

" Pag. 50, are related the experiments of sounds in *vacuo*, made both with a small bell, and with an organ-pipe : from which they could conclude nothing else, but that either the air has nothing to do in the production of sounds, or is able to do it alike in any state. This ill success of their experiments I cannot ascribe but to the bad condition of their instruments : for I can shew very easily, both with a bell, and with an organ-pipe, that the air is necessary for the production of sounds : and as the air grows thinner, the sound will grow weaker and weaker.

" Pag. 53. They find, that the rising of fluids in small hollow canes succeeds in *vacuo*, as in the open air : to which I may add, that even it doth more in *vacuo* : for if such a cane be sealed at one end, and its aperture be immersed in water in *vacuo*, presently the water will rise up into the said cane ; which would not succeed in the open air.

" Pag. 77, is related a trial to measure how great the force of rarefaction may be in water, shut up in close vessels to freeze : this they attempted by a very difficult and chargeable contrivance, and yet could discover nothing : so that I believe it would be a great deal better to try that by the same way, by which I have measured the degree of pressure produced by heat in the digester, viz. by means of a small hole at the top of the vessel containing the water, which hole being shut outwardly with a valve, and an iron rod bearing upon the center of the valve, we may hang to the rod as much weight as would be necessary to resist the force of the freezing water : as has been explained at large, in the first chapter of the new digester.

" Pag. 107. The increase of the size of a brass ring is said to have amounted by heat to  $\frac{1}{100}$  : which observation, I believe, might be useful in making pumps, or any other pipes, that require to be equal all along : for having a cylinder exactly turned, it would be easy to prepare the tubes so narrow, that the cylinder would not enter into them, but being distended by heat, they would admit it easily : so the pipe being afterwards contracted by cold would apply itself very close to the cylinder every where, and so become very equal and good. The greatest difficulty would be in taking out the cylinder ; but this inconvenience might be prevented, by making the cylinder out of four several pieces : or by some other way.

" This is all I have been able to observe, that might be carried farther. And I am ready to set upon any of these particulars, that the Royal Society will command me.

" I have carried to the hon. Mr. BOYLE the mixture of syrup of violets and spirit of wine, that was put in my hands to examine, whether the heat would alter its colour ; and having tried it, as Mr. BOYLE thought best, he did not find any sensible alteration in it.

"I have also attempted to fill a glass-tube with dry mercury, without any air intermixed with it; but I have found it a great deal more difficult than I thought: and although I have not effected it, as well as I could wish, I hope the difference between my baroscope and the ordinary ones will be found great enough, that people may judge, that with a little more time and better mercury a baroscope might be made, not at all sensible of heat or cold."

Nov. 29, at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs	Dr. LISTER
Mr. COLWALL	Dr. PLOT
Mr. HILL	Dr. AGLIONBY
Dr. GREW	Mr. ASTON.
Mr. FLAMSTEAD	

A committee was nominated for auditing the-treasurer's accounts consisting of Sir JOHN HOSKYNs, Mr. COLWALL, Dr. LISTER, Dr. AGLIONBY, and Mr. ASTON.

HANS SLOANE, M. D. was proposed as a candidate and approved.

It was ordered, that Dr. PLOT should have a gratuity presented to him; but the sum was not determined till the treasurer's accounts were audited.

December 1, being Monday, St. Andrew's day falling this year on Sunday, Sir JOHN HOSKYNs took the chair.

HENRY Earl of Clarendon was elected and admitted a member.

Mr. PITFIELD, Mr. BEAUMONT, and Mr. MUSGRAVE were likewise admitted members.

The scrutators being drawn, Mr. HALLEY and Mr. AUBREY, the Society proceeded to the election, and retained of the old council

Sir CYRIL WYCHE	Mr. HALLEY
Sir JOHN HOSKYNs	Mr. HENSHAW
GEORGE Earl of Berkley	Mr. HILL
Sir JOSEPH WILLIAMSON	Dr. LISTER
Sir CHRISTOPHER WREN	Mr. ASTON.
Mr. COLWALL	

Then were chosen out of the Society the following ten persons to complete the new council:

HENRY Duke of Norfolk  
HENRY Earl of Clarendon  
Mr. PEYPS  
Sir ANTHONY DEAN  
Mr. EVELYN  
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Mr. CREED  
Dr. SLARE  
Mr. RICHARD WALLER  
Mr. MUSGRAVE  
Mr. HOOKE.

SAMUEL PEPPYS was then chosen president by twenty nine suffrages out of thirty nine:

Mr. HILL treasurer :

Mr. ASTON

Mr. MUSGRAVE. } secretaries.

The Duke of Norfolk and Earl of Clarendon were sworn of the council.

Between this and the last anniversary election died two very eminent members of the Society, the Lord Viscount Brouncker and Dr. Croune.

WILLIAM BROUNCKER, Viscount BROUNCKER of Castle Lyons in the kingdom of Ireland, was grandson of Sir HENRY BROUNCKER, Lord President of Munster in that kingdom, by ANNE his wife, sister of HENRY Lord Morley; and was son of Sir WILLIAM BROUNCKER, Knt. by WINEFRID daughter of DANIEL LEIGH, Esq; of Newenham in Warwickshire; which Sir WILLIAM had been Commissary General of the musters in the expedition against the Scots in 1639, and afterwards of the privy chamber to King CHARLES I. and Vice-Chamberlain to CHARLES Prince of Wales, and was advanced to the rank of a Viscount in Ireland, under the title of Viscount BROUNCKER of Castle-Lyons, Sept. 12, 1645; but did not long enjoy that honour, dying at Wadham College in Oxford, about the middle of November following, being interred on the 20th of the said month in the cathedral of Christ-Church in that university, where a monument is erected to him<sup>a</sup>. His eldest son WILLIAM was born about the year 1620<sup>b</sup>, and having received an excellent education discovered an early genius for mathematics, in which he afterwards became very eminent. He was created doctor of physics in the university of Oxford, June 23d 1646<sup>c</sup>. In the years 1657 and 1658 he was engaged in a correspondence of letters on mathematical subjects with Dr. JOHN WALLIS, who published them in his *Commercium Epistolicum*, printed at Oxford in 1658, in 4to. His own as well as his father's loyalty to the Royal Family having been constant, he with others of the nobility and gentry, who had adhered to King CHARLES I. in and about London, signed the remarkable declaration published in April 1660<sup>d</sup>. After the restoration he was made Chancellor to the Queen consort, and one of the Commissioners of the navy. He was one of those great men, who first formed the Royal Society, and by the charter of July 15th, 1662, and that of April 22d, 1663, was appointed the first president of it; which office he held with great advantage to the Society, and honour to himself till the anniversary election, November 30, 1677. Besides the offices mentioned above, he was master of the hospital of St. Catharine's near the Tower of London; his right to which post was, after a long contest between him and Sir ROBERT ATKINS, one of the Judges, determined in his favour in November 1681. He died at his house in St. James's-street in Westminster, April 5, 1684, at the age of sixty four, and was interred on the 14th of that month in the middle of the choir of the church of St. Catharine's; and was succeeded in his honour by his younger brother, HENRY, who died in January 1687.

<sup>a</sup> Wood Fasti Oxon. vol. II. col. 57.

<sup>b</sup> Wood says, that he was about twenty five years old at his father's death in 1645.

<sup>c</sup> Id. col. 56.

<sup>d</sup> KENNET's registers and chronicle, p. 120, 121.

WILLIAM

ROYAL SOCIETY OF LONDON.

**WILLIAM BROUNT**, M.D., was a native of London, educated at Emanuel-college, May 13, 1679; where he took the degree of bachelor of arts in 1680, the year following was elected fellow of that college, and commenced master of arts in 1684. When his father died he became a zealous promoter of the Gresham-college. Upon his lecture taking the minutes of what passed at their first meeting, when formed into an incorporated joint-secretaries. In 1662 he was created doctor of physic by the university of Cambridge, in pursuance of the King's mandate, dated October 7, and chosen one of the first fellows of the Royal Society, after the grant of their second men- charter, and frequently afterwards into the council. June 24th the same year, he resigned his professorship in anatomy at Surgeons-hall, by the recommendation of Sir CHARLES ARKBUUGH, who resigned that office on the 28th of August, after having read on the muscles there one and twenty years. Dr. Croone held this lecture till his death, but on the 21st of October that year, 1670, which was inconsistent with the holding of it; for he soon after married Mary Cromwell, daughter of JOHN CROMWELL of London, Esq. probably about March 1675, re- he read the theory of muscular motion in the theatre at Surgeons-hall, &c. abstract July 29, 1675 he was admitted a fellow of the College of Physicians, as an assistant in his Philoſophical Col'lectanea. His abilities in his profession as a physician brought him into very considerable practice in the latter part of his life, so that the loss of him was much regretted by the citizens of London. He died of a fever, October 4, 1684, aged 42 years, and was interred in the church of St. Mildred in the Poultry, in a vault of the Loramer family, under the communion-table; his funeral sermon being preached by Mr. Peter the poor. In this sermon, which was printed the next day, he is described as not only a friend, but an ornament to the noble race of mankind; a general scholar, an accurate linguist, and acute mathematician, a well-read historian, a temper, profound philosopher; eminent for his generosity and magnanimity in the political of a just sense of the duties of religion. He left a plan of two lectures,

See above, vol. i. p. 4.  
Bishop KENNER's register and chronicle. p.  
Dr. WARD ubi supra. p. 320. 321.  
sect. 8. p. 32  
vol. ii. p. 321.

<sup>1</sup> See, e.g., *ibid.*, vol. 1, p. 4.

above, and  
on KENNET's register at 120-321.

791. *D. ...* *WARD ubi supra.*  
2. 22.

2. feet. 8 p.  
3. 4 p. 1. 321.

Dr. W.

X 12

which he designed to have founded, one of a lecture to be read in Latin on three several days at the College of Physicians, before the members of the college, upon the nerves and brain, with a sermon to be preached at the church of St. Mary Le Bow: the other of a lecture to be yearly at the Royal Society upon the nature and laws of muscular motion. This and other public designs of his were executed by his widow, who, after his death, married Sir EDWIN SADLEIR, Bart. and the lecture at the Royal Society was begun in December 1738, by ALEXANDER STUART, M. D. physician to her late Majesty, QUEEN CAROLINE: but the circumstances of the legacy for the support of the lecture in the College of Physicians, and of the sermon, prevented them from taking place till 1749, when the lecture was read on the 14th, 15th, and 16th of September by THOMAS LAURENCE, M. D., and the sermon preached on Monday the 18th by the writer of this history.

December 3, Sir JOHN HOSKYNs in the chair.

Part of a letter of Mr. LEWENHOECK, dated at Delft, July 25, 1684, was read, concerning the parts of the brain of several animals, the chalk stones of the gout, the leprosy, and the scales of eels. The latter part of this letter was reserved for the next meeting.

A letter of Mr. THOMAS MOLYNEUX to Mr. FLAAK, dated at Leyden, November 20, 1684, N. S., was read, containing an account of some new anatomical discoveries of Mons<sup>ieu</sup> DU VERNEY at Paris, who judged the vesiculae feminales not to be repositories of the semen, because they are sometimes full, though they do not communicate with the vasa deferentia: that whether they be double or treble, the insertions into the urethra are distinct from the deferentia, &c.: That, besides the ordinary prostate, he had observed in some beasts, at the root of the penis, two other glands, composed of several acini, very hard and firm, which send single ducts into the urethra. These he called *prostatæ succenturiatæ*, and supposed to be of the same use with the true prostate; because some animals have no other than them.

Dr. TYSON was desired to report what he could find of these discoveries, and one of the secretaries was ordered to give him a copy of Mr. THOMAS MOLYNEUX's letter.

\* He continued to read this lecture till 1726, when he was succeeded by MARK ARENSIUS, M. D.

\* The succeeding preachers were 1750. WILLIAM STURLEY, M. D. fellow of the College of Physicians, and of the Royal Society; whose sermon is printed.

1751. STEPHEN HALL, D. D. F. R. S. whose sermon is printed.

1752. THOMAS CHURCH, D. D. whose sermon is printed.

1753. EDWARD VERRON, D. D. F. R. S.

rector of St. George's Bloomsbury, whose sermon is printed.

1754. CURT BARTON, M. A. rector of St. Andrew's 13thborn, whose sermon is in print.

1755. JAMES TOWNLEY, B. D. rector of St. Benet's Grace Church.

1756. JAMES KILMER, M. A. rector of Leaden near Colchester, Essex.

\* It is printed in the *Philos. Transact.* N<sup>o</sup>. 168, p. 883. for February, 1684.

? Letter-book, vol. ix. p. 304.

A Latin

1684.] ROYAL SOCIETY OF LONDON.

A Latin letter of Mr. JOHN DAVIS, minister of Leake in Nottinghamshire<sup>341</sup> to Mr. ASTON, dated three, November 26, 1684, was read, concerning the *sphæro Wittenbergicus, five sphæro inverfis, crucifera, æqualis fuerit et refertur.* He mentioned, that he could perform some effect like this with a siphon and some other additions of his own, which he did not discover. The secretary was ordered to return an answer to him.

A letter of Mr. WILLIAM MOLYNEUX to Mr. ASTON, dated at Dublin, November 15, 1684, was read, remarking, that the Connaught worm, mentioned in the last meeting, was the elephant caterpillar of GOEDARTIUS, N. 125: that he was convinced that Lough Neagh stone, well calcined applies strongly to the magnet: that Sir WILLIAM PETTY's ship was launched on Michaelmas day, drawing fifty inches before, and forty abaft: and that she bore her mast without any ballast.

This letter accompanied a copy of the minutes of the Dublin Society from October 6 to November 24, inclusive, which were as follow<sup>b</sup>:

" Octob. 6, 1684. we first met after our adjournment, but few being present  
" nothing was done.

" Octob. 13. We had no meeting of the Society, but there was a meeting  
" about the building of the sluice vessel.

" Octob. 20. The minutes of the Oxford Society from to were read  
" and considered. A letter from Mr. THOMAS MOLYNEUX at Leyden was read,  
" which gave an account of a curious movement shewed to him by Monk  
" HUYGENS at the Hague, in his own closet: it shewed the month, day, hour,  
" and minute, with the posture of all the planets corresponding, and by a key it  
" was to be set to any time past or future. The same letter gave an account  
" of his keeling the whole contrivance of the same ingenious person's astrolæopia  
" compendiaris.

" Octob. 27. Nothing passed but some orders about the method of our ap-  
" proaching election.

" Nov. 1. This being All-Saints day, our anniversary day of election, we  
" proceeded therein according to the method of the Royal Society of London,  
" Sir WILLIAM PETTY, Knt. was chosen president, WILLIAM MOLYNEUX,  
" Esq. secretary, and WILLIAM PEDDALL, Esq. treasurer.

" Nov. 3. Sir WILLIAM PETTY, our new president, brought in a paper of ad-  
" vertisements to the Dublin Society, containing some proposals for modelling our  
" future progress. These were so well approved of, that they were really

<sup>a</sup> Letter-book, vol. ix. p. 307. An extract of  
it is printed in the *Philos. Transact.* N. 167. p.  
846.

<sup>b</sup> Letter-book, vol. ix. p. 311.  
<sup>c</sup> *Ibid.* p. 307.

<sup>d</sup> *Ibid.*

submitted to by the whole company. At this meeting the hon. Sir CYRIL WYCHE, Knt. principal Secretary to the Lord Lieutenant, and president of the Royal Society, was pleased to be admitted into our Society; and so likewise was Sir ROBERT REDDING, Bart. one of the council of the said Society Royal. Mr ST. GEORGE ASHE read a discourse concerning the squaring of the circle, &c. not offering therein to do it, but endeavouring to demonstrate it possible; and likewise a discourse, whether any real advantages or comprehensions in mathematics might be expected therefrom, if effected. The refutation of this discourse he promises at the next meeting. Dr. MULLEN gave an account of the following experiments: The expressed juice of a Connaught worm given to a dog did no perceivable harm; but another dog, who had taken the skin, was found dead two days after. The root of *filipendula aëtica* given to a dog, killed him in three days. A salt taken from a ground consisting of earth and sea-sand coagulated milk, yet could not be crystallised. He also produced a stone, said to be an elf dart, but it was agreed to be nothing but the head of an arrow, or spear of the ancients. He shewed likewise a stone curiously resembling a wrought button; as also a small stone, that moves being put into vinegar, by reason of the little bubbles on which it slides, which arise from the fluctation between it and the acid.

" Nov. 10. A letter was read from Mr. MOSGRAVE, containing the minutes of the Oxford Society from October 21, inclusive. Our president was pleased to expatiate upon several heads he lately presented us for our future regulation. Mr. MOLYNEUX shewed the company an experiment in hydrostatics, tending to the resolution of an hydrostatical problem proposed to him. A letter was read from RICHARD BULKELEY, Esq. at Old-Baun containing the description of a machine lately contrived by him, for registering the force of the wind. Mr. SMITH read a discourse *De signis contagii*. He proposed also, that some queries may be given to him, relating to the petrifying of Lough Neagh; for that suddenly he intended a journey down there. Mr. MOLYNEUX promised to draw up some queries. Dr. MULLEN gave an account of the following experiment: A vintner in this town being troubled with a consumption, complained much of a trouble in the left side of his thorax, and would often, with some confidence and persuasion, assert, that he was sure he should do well enough, could the thorax be opened, and a certain piece of his lungs be cut out with impunity. But this desperate remedy was not hearkened to by any one; so the sick man died. Notwithstanding Dr. MULLEN resolved to try the experiment on a dog, and opening his thorax he cut off from one lobe of his lungs a piece three inches long and two broad, and making a ligature to hinder the effusion of blood, he closed the wound. The dog recovered perfectly well, and shewed no manner of want of what he had lost. About six months after, the doctor hanged the dog, and opening him, found the end of the lobe, where the wound was made, firmly united to the intercostal muscles, where the thorax was opened, and the thread, that made the ligature, was vanished, and supposed discharged at the wound in the breast.

" Nov. 17. A letter was read from Mr. BULKELEY at Old-Baun, containing  
" the

" the description of a pump, contrived by him for ships: it is moved by the  
 " wind, and so requires no hands from other work in the ship. An account of  
 " some observables in the body of a woman, lately dying with some odd sym-  
 " ptoms, as taken by Mr. TULLERSON in the presence of some physicians, was  
 " read. Dr. MULLER presented an hexagonal piece of rock-crystal from the  
 " county of Kerry, where they are found in great plenty, and all curiously fi-  
 " gured in this shape. Mr. ASHE finished his discourse concerning the advan-  
 " tages, that may be expected from the squaring the circle, doubling the cube,  
 " &c. which he thought sufficiently attained for all uses by the approximations  
 " and mechanical methods already known.

" Nov. 24. A letter was read from Mr. ASTON, F.R.S. It informed us of  
 " a contest between KUNCKELIUS and Dr. VOIGHT, whether common spirit of  
 " wine be acid or oleous: and of a letter from STURMIUS about Mr. HALLEY's  
 " hypothesis of the magnetical poles. A letter was read from Mr. MUSGRAVE  
 " giving an account of a large preternatural glandulous substance, growing be-  
 " tween the pericardium and heart of an ox. Ordered, that the thanks of this  
 " Society be returned to Mr. MUSGRAVE for his extraordinary communication.  
 " Sir WILLIAM PETTY, our president, brought in a paper of sixty three misel-  
 " laneous experiments to be prosecuted by this Society. Mr. KEO read an ac-  
 " curate and useful discourse of the boys and loughs of Ireland, shewing their ori-  
 " gin, and the ways and methods for reducing them to profitable land. A  
 " paper of queries relating to the petrifying of Lough Neagh, as drawn by Mr.  
 " MOYSEUX, was read, and committed to the care of Mr. SMITH, who sud-  
 " denly intends a journey down thither. Sir ROBERT REDDING gave an account  
 " of the success of an experiment in the Royal Society for altering the verticity of  
 " a needle by pulvis fulminans."

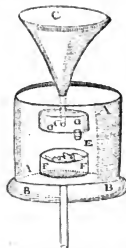
Dr. PAPIN brought in a draught of the manner of casting medals in vacuum, as  
 follows:

" The art of casting metals is so useful in the world, that I hope the Royal  
 " Society will not dislike my endeavours to improve it by the following con-  
 " trivance.

" AA is a receiver, the great aperture of which is applied to the pneumatic  
 " engine.  
 " CC is a funnel, the flank whereof is soldered in a hole at the top of the re-  
 " ceiver AA, and reacheth into a little vessel DD, included in the receiver  
 " AA.  
 " DD is a little vessel to receive the melted metal from the funnel CC, and to let  
 " it out through the hole E.  
 " FF is the mold to receive the melted metal from the hole E.  
 " BB is the plate of the pneumatic engine.

\* See after, vol. 6. P. 200.

" The



"The Shank of the funnel CC, ought to be stopp'd with wax or cement, and the receiver being well exhausted of air, the melted metal is to be poured quickly into the funnel CC, so it will melt the wax, and run into the vessel DD, and falling through the hole E it will fill the mold FF. Then the outward air following the metal immediately, will press it into the mold with such a force, that it must take the impression of any little stroke that is printed therein better much than if the mold had not been exhausted of air. I have therefore cast two medals, one in the open air, and the other *in vacuo*, and I find much difference between them: because that in the open air is smooth, and the strokes of the relievo are roundish and blunt: but the metal cast *in vacuo* hath its strokes sharper, and the metal hath been so close applied to the sandy mould, that it hath taken the impression of the roughness of the sand, as may be seen in the medals I have brought with me. It was necessary to receive the metal from the funnel in a close vessel as DD: because if it should fall from the funnel directly into the mold, being driven by the whole pressure of the atmosphere, it would fly about with a great violence, and might do some mischief. If the Society pleased to give me directions to follow this experiment, I hope it will prove useful on many occasions."

He was ordered at the next meeting to make the trial.

Mr. BAILEY presented, in the name of Mr. NICHOLAS WAITE, a piece of the asbestos linen, which had been burnt before the Society.

Mr. BAILEY presented likewise a pair of a Chinese woman's shoes, with a piece of Calambo wood.

Mr. Houghton shew'd a very small and very big walnut, both perfect; which were ordered to be measured.

The secretaries were ordered to wait upon the new president in the Society's name.

Decem. 10, at a meeting of the COUNCIL were present,

Sir ANTHONY Dean	SAMUEL PEPYS, Esq; president
Mr. HENSHAW	Dr. LISTER
Mr. HILL	Mr. HOOKE
Dr. GALE	Mr. HALLEY
Mr. CREED	Mr. RICHARD WALLER
Dr. SLARE	Mr. ASTON
Mr. MEREDITH	Mr. MUSGRAVE.

I

THE

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The president was sworn, and such of the council present as had not taken their oaths. 345

The treasurer's account being not yet audited, a committee was named for that purpose, consisting of the president, Sir JOHN HOEKINS, Mr. COLWALL, Dr. LISTER, and Mr. ASTON.

At a meeting of the SOCIETY on the same day, SAMUEL PEPPYS, Esq; president in the chair.

The Society having received the picture of Sir JOSEPH WILLIAMSON, formerly their president, ordered it to be placed in their meeting room, and desired Mr. HILL and Dr. GALE to wait upon him with their thanks.

A letter from Monf. JUSTEL to Mr. ASTON<sup>a</sup> was read, mentioning, that Monf. FREMONT D'ABLANCOURT had written to him, that he had seen thele two fit vessels would leave about half the quantity of a water almost insipid, but having a faint peppery taste in the throat. 2. The blood or milk, by different expositions to the air, and different impressions from the air, would appear sometimes red, and at other times green.

Dr. PAPIN remarked, that these experiments had been often tried.

A letter from Monf. FREMONT D'ABLANCOURT to Mr. ASTON, dated at Paris December 20, 1684. N. S., was read, expressing his acknowledgments to the Society for the honour of his election into it, and offering to promote the end of it, as he should be directed.

The secretary was ordered this letter, and to desire Monf. D'ABLANCOURT to write sometimes to the Society.

The minutes of the Dublin Society from October 6 to November 24, 1684, were read; and upon the mention in them of a paper of advertisements of Sir WILLIAM PEPPY for regulating and modelling the future progress of that Society, the secretary was ordered to desire a communication of it.

There being likewise mentioned an engine to shew the force of the wind, and a sea-pump to go with the wind, it was likewise desired to know the success upon their trials.

With regard to the cutting off a piece of the lungs, Mr. MUSGRAVE observed, that this had been done about six years before by Mr. FRY a chirurgeon at Oxford.

<sup>a</sup> Letter-book, vol. ix. p. 316.

<sup>a</sup> Ibid. p. 317.

Crytal

Crystals of an hexagonal figure being mentioned to be found in the county of Kerry, Dr. LISTER said, that he conceived, that most sorts of stones had their peculiar crystals belonging to them, and that he had seen eleven or twelve sorts diversely figured. He was desir'd to give an account of the shapes of such as he had observ'd.

A paper about draining bogs being mentioned, Mr. PACKER remarked, that he had been inform'd of one way now us'd, which was by digging all the peat in a canal; and that by this way a bog was said to have sunk thirty feet.

Upon mentioning sixty three miscellaneous experiments propos'd by Sir WILLIAM PERRY as *demonstrata*, a paper containing them, which had lately been printed at Dublin, was read, and being very well approv'd of, was order'd to be reprinted here, in order that the members of the Society might have copies, and consider of the particulars, which they would choose to examine.

The president select'd those more immediately relating to navigation.

Dr. PAPIN gave the following account of the book, intitled *Sypho Wurtembergicus* :

" The account I can give of the book call'd *Sypho Wurtembergicus*, is, that  
 " it doth promise very great and extraordinary things, viz. 1. That a syphon  
 " will work with equal legs. 2dly. That it will work, though neither of its  
 " apertures are quite under water. 3dly. That after a long dry weather, when  
 " the water comes again to the syphon, it will begin again to work without any  
 " attraction, pression, or rarefaction of any engine: and Mr. DAVYS writes, that  
 " he hath done the same effects: so that I must not question the truth of the thing.  
 " although I don't well conceive how it may be perform'd. Nevertheless, I have  
 " fulfilled all their conditions, by filling the syphon with long pieces of flannel; but  
 " the effect is very slow, and far from reaching to the height these gentlemen pretend  
 " to. I can also perform all the effects describ'd in the book, by putting two sy-  
 " phons within one another; but then it will be more chargeable than an ordinary  
 " syphon, and of no advantage, which yet these gentlemen affirm to be great in  
 " their invention: so I cannot pretend to have made the discovery of their secret.  
 " Nevertheless, if the Royal Society thinks it worth while, to see what I have done  
 " about it, I will perfect it a little more, and bring it hither: it may perhaps  
 " give better thoughts to some body else."

Dr. PAPIN was order'd to shew at the next meeting what he could do in this experiment.

He prosecuted likewise the experiment of casting medals *in vacuo*; his account of which was as follows :

<sup>1</sup> Register book, vol. vi. p. 201.

<sup>2</sup> *Ibid.* p. 207.

" By

" By prosecuting the experiment of casting in mould *in vacuo*, I have found the  
 " way given in the last week liable to an inconvenience, viz. That the metal  
 " being driven into the little vessel with great violence, will fly in drops, some  
 " of which may fall through the great hole into the mould, and so sometimes  
 " spoil it. I have therefore tried to receive the melted metal, that comes from  
 " without, in a small crucible full of the same melted metal, and so sometimes  
 " gently into the mould: so I may try at present the difference between metal cast  
 " *in vacuo*, or in the open air, upon a smooth plate: for if the metal, cast *in va-*  
 " *cuo*, will take the smoothness of the plate, as well as it takes the roughness of  
 " the sand, that may be useful for casting several works, that require to be  
 " polished."

In performing this experiment, some of the lead running over, and falling upon  
 the side of the glass receiver, broke it. Upon which it was ordered, that the ex-  
 periment should be again made at the next meeting.

Mr. Hooke shewed the draught of a new level invented by himself, which, he  
 said, exceeded all those lately mentioned in the book published by Mon<sup>r</sup>. DE LA  
 HIRE.

It was ordered, that Mr. HUNT take directions from Mr. Hooke for the  
 making that level against the next meeting, that it might be then tried.

Mr. HALLEY gave an account, that he had lately seen Mr. NEWTON at Cam-  
 bridge, who had shewed him a curious treatise, *De Motu*; which, upon Mr.  
 HALLEY's desire, was, he said, promised to be sent to the Society to be entered  
 upon their register.

Mr. HALLEY was desired to put Mr. NEWTON in mind of his promise for the  
 securing his invention to himself till such time as he could be at leisure to publish it.

Mr. PAGET was desired to join with Mr. HALLEY.

December 17. It being queried what might be the difference between crystal and  
 Bristol stones, Dr. LISTER said, one difference might be, that crystals strike fire,  
 and Bristol stones do not.

Upon mentioning the level ordered to be made at the last meeting, Mr. Hooke  
 said, that, instead of that, which would only have been for a trial, he would  
 cause an exact one to be made in brass, which should be brought to the Society.

Sir ANTHONY DEAN gave an account, that Sir WILLIAM PEPYS had sent  
 over a challenge or wager in fifteen propositions, wherein were asserted the virtues  
 of the sluice-bottomed vessels beyond any vessels of the common make. *To this*  
 challenge Sir ANTHONY DEAN produced an answer, signed by himself and  
 Mr. PEPYS: which being read, was found to contain the conditions of the several  
 wagers.

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wagers, and the sums offered to be laid upon each proposition. This, Sir ANTHONY said, was not done out of any enmity to Sir WILLIAM PETTY, for whom he had a great esteem; but that Sir WILLIAM might be provoked to a full proof of his assertions, which would not fail to produce many good experiments.

A copy of this paper was desired, which Sir ANTHONY DEAN promised to permit it to be taken, as soon as the paper could be signed.

Mr. HOOKE read a paper of observations concerning Dr. VOSSIUS's late book<sup>1</sup>; and upon this occasion mentioned some reasons, why the moon had no atmosphere.

Dr. GALE took notice, that Dr. VOSSIUS had said, that JULIUS AFRICANUS made mention of ignis Circus compounded of sal fossile, sulphur vivum, and pulvis pyriti, instead of charcoal. He desired therefore, that the manuscript in the Barrocan library at Oxford might be examined in this particular, to the end it might be known, whether it be the first JULIUS AFRICANUS, who was contemporary with ORIGEN, or some one later.

Mr. AUBREY related an observation made by colonel JOHN WINDHAM, about the different height of the barometer in the cathedral of Salisbury: that the steeple is 404 feet high: that the weather-door of the cathedral is 4280 inches: and that the mercury subsided in that height  $\frac{7}{16}$  of an inch.

Mr. MUSGRAVE read a letter to himself from Mr. JOHN BALLARD<sup>2</sup>, dated at Oxford, December 10, 1684<sup>3</sup>, mentioning the trial made there of some of the experiments of Monf. KUNCKEL: which letter was as follows:

"Our president being returned, we had again yesterday a meeting, where we had read this account Mr. DES-MESTERS gave me of those experiments  
"KUNCKEL's, Mr. ASTON mentioned in a letter a little before, wherein some  
"things seemed not a little surprising, as that in § the 3d, which shews a meet al-  
"kali does coagulate, and in § the 6th, where the sublimat sal armoniaci encrasscs  
"coagulation. As to the colour of syrup of violets, mixt with spirit of wine, it was  
"thought impossible there could be any judgment made of it in that trial, which  
"Mr. ASTON says was made but by candlelight. As to the sensible heat of wa-  
"ter and spirit of wine mixt, we cannot conclude from what DES-MESTERS here  
"says, but that it may be true, since certainly the perceiving so nice a warmth  
"by the hand must very much depend upon the temper the hand at that time is in,  
"which, if colder than ordinary, feels an heat in a luke-warm liquor; if very  
"warm itself, feels that very same liquor sensibly cold. We in recompence for  
"your handkerchief have sent you a piece of paper of the same matter. It was  
"presented us by Mr. LLOYD (the reguler of the laboratory beneath) who at-  
"tending to what passed among us about the abessus, and having received since

<sup>1</sup> *Flavis Observationes*, printed at London, 1685. in 4to.

<sup>2</sup> Of New-College, Oxford, afterwards doct<sup>r</sup>

of physic.  
Letter-book, vol. ix. p. 327.

<sup>3</sup> some

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"some quantity of it from the isle of Anglesey, he pounded some of it in a mortar, which the paper maker mixing with water in his trough, took up like common papers, and the linteous parts ran easily together on the instrument like other paper, only the weight of this line causing it quickly to subside, forced them to open flur it, and be very nimble in their taking it up. It might, (very thought, if to any purpose, be made much finer and whiter, but being so very brittle before, and much more so after burning, it is scarce likely to be of any use. As to the stone you speak of, Dr. WALLIS thinks to have seen the very stone, which it was, he says, it was taken out of the father of Mr. ADDONHAM BYFIELD, and not out of himself, and that he lived with great pain till the day sevennight after the falling down of the stone into the bottom of his bladder, and did not die, as you say, within two hours. He says the stone had another lough in a cavity within it, like what we call eagle-stones, and that afterwards, being broken by an accidental fall, discovered its conixture, which was very hollow, spongy and light, &c."

Mr. MUSGRAVE read also a particular account of the trials made by Mr. DESMERSERS upon occasion of the forementioned experiments found in Monsieur KUNCKEL: which account was as follows:

"Mr. ASTON in his letter, dated November 13, 1684, making mention of the trial of some experiments found in KUNCKEL, viz. That spirit of wine and syrup of violets make a green: That spirit of wine and milk in equal parts curdle: That a few drops of water and spirit of wine heat perceptibly; it was ordered, that the same experiments should be tried here, which was done in the following method:

- "1. We mixt spirit of wine with syrup of violets, but found no other change in the colour, than that the syrup became of a paler blue upon its being diluted by the spirit of wine; there being not the least change toward a green as Mr. ASTON observed.
- "This experiment was tried both with plain and tartarised spirit of wine with equal success.
- "2. We mixt spirit of wine and milk, of each equal parts, which coagulated considerably in less than a minute of time; but making the like trial with spirit of wine tartarised and milk, no coagulation followed.
- "Query, Whether the coagulative virtue in simple spirit of wine be not to be ascribed to the common salt from which 'tis distilled?
- "We then tried some other experiments upon milk, not mentioned by Mr. ASTON, viz.
- "3. We mixt arena tartari per deliquium and milk, of each equal parts, which coagulated, but not so considerably, nor altogether so soon as simple spirit of wine and milk.
- "4. Arena tartari per deliquium poured upon the uncoagulated mixture of milk and spirit of wine tartarised, quickly coagulated.

Letter-book, Vol. ix. p. 28.

46 Sub.

" 5. Sublimate armoniaci poured upon milk made not the least coagulation, though it was suffered to stand a good while; we then poured simple spirit of wine upon this mixture, but no coagulation followed.

" 6. We then poured sublimate tartarici upon the coagulation made with equal parts of milk and spirit of wine, which was so far from restoring it to its fluidity, that it increased the coagulation.

" 7. The forementioned experiments made upon cold milk were at the same time made upon hot milk, with the same success, excepting that arena tartari per deliquium being poured upon warm milk, the coagulation was not discernible till the milk was almost cold, neither did the coagulation appear so hard as with cold milk.

" 8. In order to the third experiment mentioned by Mr. Astruc, viz. that water poured upon spirit of wine heat perceptibly, we first made trial what operation water and wine separately would have upon the thermometer, and we found, that a thermometer being put into pump water (and the same experiment afterward held good with rain water; the inclosed tincture rose  $\frac{1}{2}$  of an inch above the mark; being thence removed into spirit of wine, it rose about so much higher, and being thence removed into spirit of wine and water, it rose an inch higher than the mark it stood at before, yet the heat was not discernible by the hand.

" 9. We then tried the same experiment with spirit of wine and milk, and found, that a thermometer being put into cold milk the tinged spirit contained in the thermometer rose a little, as it did with water; but when an equal quantity of spirit of wine was poured upon the milk, it rose to the same height as when put into spirit of wine and water.

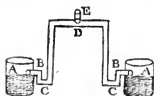
Dr. LISTER queried, whether spirit of wine, drawn from Nants wine, being a sharp raw wine, will not coagulate more than spirit of wine drawn from ripe Languedoc wines; as from acid things there always rises an acid spirit.

Dr. PAPIN shewed a way, by joining two syphons together, to work all the effects said in the book to be proper for the *Sypho Wurtembergicus*. He also proposed another way to do the same things by one syphon bent at the ends, as in the figure then produced. His account was as follows " :

" Being commanded to make up a syphon fit to perform all the effects described in the book called *Sypho Wurtembergicus*, I have perfected the double syphon spoken of in the last meeting, and, if the Royal Society please, I can shew at present, that it hath them six marks, which the author doth pretend to be peculiar to his syphon, and whereby it ought to be distinguished from any other. Nevertheless if I was to do the same again, I would use no other art, but to make both of the legs of the syphon crooked at the end, as is represented in the scheme: because this is more simple and easy than the double syphon, and yet will do the same effects. So if the author will give any more admiration for his contrivance, he must discover something farther of its properties and uses, since all he hath hitherto said of it may be so easily performed.

" Register, vol. vi. p. 202.

" AA :



“ AA : the two vessels situated in the same level.

“ BCD BC : the syphon crooked at both ends, whose apertures must lie in the same level.

“ E : A small pipe to fill up the syphon exactly, and to be shut afterwards.

“ It is plain, that such a syphon will always remain full though neither of its apertures lieth quite under water, because the water contained in the space BC will keep the outward air from getting towards the upper part D. So this syphon will always be ready to work, as soon as the water comes to reach some part of either of its apertures, and by the same means it will perform all the effects described in the book.”

The Society adjourned till after the Christmas holy-days.

1687, *January 7*, Mr. PEPYS president in the chair.

The president communicated a copy of a letter, which had been written by Sir WILLIAM PETTY to Sir J. W. dated at Dublin, December 18, 1684, concerning the miscarriage of his new vessel in the several trials made with it on the 15th and 16th of December, 1684. The letter was as follows :

“ I have troubled you with several accounts of my naval experiments ; perhaps, you may think, because I expected your applause for them : but I do now with the same candor and ingenuity acquaint you, that upon the 15th and 16th days of this month we have made an experiment upon the sea, in which were so many complicated and perplexed circumstances, as to make me stagger in much of what I formerly said, but not in the least concerning the strength of our fabric. Our principal disappointment was in the bearing of sail, which, all the world allows, will be easily remedied by virtue of our principle. We thought to have remedied our ship's tenderness for the present by ballast, upon the advice of good common seamen ; but find, that (as our models had formerly told me) it had not the same effect to stiffen our sort of shipping as the common : so as this use of ballast did but bring new mischiefs upon us, that is to say, did damp the ship's motion, and disturb her working. The cause of the tenderness was an endeavour, besides the introducing a new principle, to make a small passage boat of twelve foot broad high enough to carry horses, hoping to have gotten some small matter thereby, to have defrayed our charges. But so it is, that we are now to begin again, all men believing, that the principle will be good. For my own part, I intend to spend my life in examining the greatest and noblest of all machines, a ship : and, as I have always told you, I shall content myself in that I have to this purpose used more effectual means, and with less by-ends, than the generality of other men, and I promise

<sup>a</sup> Letter-book, vol. ix. p. 326.

“ you

"you, if I can find just cause for it, will write and publish a book against myself. So much do I prefer truth before vanity and imposture, &c."

A letter from Mr. WILLIAM MOLYNEUX to Mr. ASTON, from Dublin was read, giving likewise an account of the failure of Sir WILLIAM PETTY's new ship; which letter was as follows<sup>o</sup>:

"I promised to give you an account of the performances of Sir WILLIAM PETTY's ship, and I am glad of an opportunity of writing to you, and serving you in any thing; but I am heartily sorry at the occasion, that at present offers itself, and would therefore willingly be silent. But 'tis a matter so public, and of too universal concern to be concealed, and withal 'twas so probably and fairly offered at, that human frailty need not be ashamed of miscarrying therein.

"Sir WILLIAM PETTY's ship was tried this day sevennight in our harbour between Rings-End and the bar; but she performed so abominably, as if built on purpose to disappoint in the highest degree every particular, that was expected from her: she had spread but a third of the sail she was to carry, the wind did but just fill her sails, and yet she stooped so, that she was in danger of being overset every moment; a blatt from a smith's bellows superadded had overturned her. She was propoised not to want an ounce of ballast, and yet she had in her ten tun of paving stones, and all would not do; the seamen swear they would not venture over the bar in her for 1000 pounds a piece. Even right before the wind she does nothing. So that the whole design is blown up. What measures Sir WILLIAM will take to redeem his credit, I know not, but I am sure a greater trouble could hardly have fallen upon him.

"When I was just closing my letter, yours of the 11th instant was brought me. I am very glad the Royal Society has continued you secretary. Sir WILLIAM PETTY says, that had he thought his catalogue would come before you, he should have been more careful in it; but such as 'tis, he freely gives it up to your disposal. As to his modelling our Society, I shall send you his paper as soon as I can, by the next post or two at farthest. I here send you a catalogue of our members. We have adjourned till the Monday next after Twelfth-day. I shall soon transmit you our minutes.

"A list of the Dublin Society, December 23, 1684.

"RICHARD ACTON, B. D.  
"ST. GEORGE ASHE, A. M.  
"MARK BAGGOT, Esq;  
"JOHN BARNARD, A. M.  
"RICHARD BULKELEY, Esq;  
"JOHN BULKELEY, Esq;  
"PAUL CHAMBERLAIN, M. D.

"R. CLEMENTS, Esq;  
"FRANCIS CUFF, Esq;  
"CHRISTOPHER DOMINICK, M. D.  
"NARCISSUS Lord Bishop Fernes and  
"Leighlin.  
"HENRY FERNELEY, Esq;  
"J. FINGLASS, M. A.

<sup>o</sup> Letter-book, vol. ix. p. 334.

"SAMUEL

- |                                  |                                      |
|----------------------------------|--------------------------------------|
| " SAMUEL FOLEY, M. A.            | " Sir WILLIAM PETTY, Knt. president. |
| " ROBERT HUNTINGTON, D. D.       | " WILLIAM PLEYDALL, Esq; treasurer.  |
| " DANIEL HUOLAGHAN, M. D.        | " Sir ROBERT REDDING, Bart.          |
| " JOHN KEOGH, M. A.              | " EDWARD SMITH, M. A.                |
| " WILLIAM KING, M. A.            | " JOHN STANLEY, M. A.                |
| " JOHN MADEN, M. D.              | " JACOBUS SYLVIVS, M. D.             |
| " WILLIAM MOLYNEUX, Esq; secret. | " GEORGE TOLLET, prof. mathem.       |
| " WILLIAM Lord Viscount Montjoy. | " Sir CYRIL WYCHE, Knt.              |
| " ALLEN MULLEN, M. D.            | " CHARLES WILLUGHBY, M. D.           |
| " WILLIAM PALLISER, D. D.        | " JOHN WORTH, D. D. D. of St. Pat.   |

Another letter of Mr. WILLIAM MOLYNEUX to Mr. ASTON, dated at Dublin, December 27, 1684, was read, containing the advertisements to the Dublin Society by Sir WILLIAM PETTY, president of the said Society: which advertisements were as follow\*:

- " 1. That they chiefly apply themselves to the making of experiments, and prefer the same to the best discourses, letters, and books, they can make or read, even concerning experiments.
- " 2. That they do not condemn and neglect common, trivial, and cheap experiments and observations; not contenting themselves without such, as may surprise and astonish the vulgar.
- " 3. That they provide themselves with rules of number, weight, and measure; not only how to measure the plus and minus of the qualities and schemes of matter; but to provide themselves with scales and tables, whereby to measure and compute such qualities and schemes in their exact proportions.
- " 4. That they divide and analyse complicate matters into their integral parts, and compute the proportions, which one part bears to another.
- " 5. That they be ready with instruments and other apparatus to make such observations, as do rarely offer themselves, and do depend upon taking opportunities.
- " 6. That they provide themselves with correspondents in several places, to make such observations as do depend upon the comparison of many experiments, and not upon single and solitary remarks.
- " 7. That they be ready to entertain strangers and persons of quality with great and surprising experiments of wonder and ostentation.
- " 8. That they carefully compute their ability to defray the charge of ordinary experiments, forty times per annum out of their weekly contributions, and to procure the assistance of benefactors for what shall be extraordinary, and not pester the Society with useless or troublesome members for the lucre of their pecuniary contribution.
- " 9. That whoever makes experiments at the public charge, do first ask leave for the same.
- " 10. That the secretary do neither write nor receive any letters on the public account of the Society, but what he communicateth to the Society.

\* Letter-book, vol. ix. p. 337.

- " 11. That persons (though not of the Society) may be assisted by the Society, to make experiments at their charge upon leave granted.
- " 12. That for want of experiments there shall be a review and rehearsal of experiments formerly made.
- " Since these we have another order.
- " 13. That the president at the present meeting shall order what experiments shall be tried at the following meeting, that accordingly a fit apparatus may be made for it."

These advertisements were referred to the council, to consider how far they might be useful to the Royal Society.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at New-college Oxford, December 23, 1684\*, was read, relating to the two following cures of Dr. TURBERVILLE.

" Whatever is communicated by Dr. TURBERVILLE must certainly be very welcome to you : in a letter he lately sent me I find these observations.

" He had a gentlewoman his patient, who was very much troubled with the falling sickness ; she brought her water to the doctor, in which he perceived many short worms, full of legs, of the likeness of millepedes : he gave her two or three purges, first with pil agarici and rhubarb : but the worms still continued to be seen in the water, and she returned every day. At last he gave her an ounce of oxymel helleboratum in tanfy-water, which wrought well, and was successful, so that she was perfectly cured.

" He had another patient, whose eye was as big as a hen's egg ; yet was very fair, without blemish, rheum or redness : the person had his sight pretty well : the doctor judged the distemper to proceed from thin humours falling on the eye, and causing the extension of the coats, and therefore made use of drying medicines applied to the head and eye ; which, with an issue in the neck, cured the patient ; the distemper the doctor names oculus bovinus or oculi hydrops."

Mr. HOOKE remarked, that Mr. WHITE the chemist at Oxford had been troubled with the falling sickness, and by a vomit had brought up several worms ; but he could not tell the sort, referring himself to the person living at Oxford.

A letter from Mr. THOMAS MOLYNEUX to Mr. ASTON, dated at Leyden, December 29, 1684, O. S.†, was read, intimating his readiness to send the Society a catalogue of the natural curiosities preserved by Dr. HERMAN, professor of botany at Leyden in his peculiar sort of balsam ; as also some account of the rarities in Dr. SWAMMERDAM's collection in the custody of a person in that city.

\* Letter-book, vol. ix. p. 376.

† Ibid. p. 331.

In this letter was contained an account of a prodigiously large *os frontis* belonging to the school of physic at Leyden<sup>1</sup>. From its juncture with the nasal bones to the terminating by the futura sagittalis, it was the convex way nine inches  $\frac{1}{5}$ ; from side to side twelve inches  $\frac{1}{4}$ ; in thickness  $\frac{1}{2}$  an inch. Mr. MOLYNEUX supposed, that the man, to whom it belonged, must be double the height of ordinary men.

The latter part of Mr. LEEWENHOECK's letter of July 25, 1684, was read, being observations on the brain of an ox and sparrow; on moxa, and that cotton is the fittest succedaneum for it; on the chalk bred in men, who have long had the gout: on the leprosy, as far as people are said to have it in Holland: on eels, in which he discovered both scales and fins<sup>2</sup>.

Dr. PAPIN made the following experiment. He took a bottle half full of lime-juice, and exhausted of air, which he heated at the fire, but not so much as to make it boil. Nevertheless the same bottle, when it was taken from the fire, and shaken, or turned upside-down, and then put into freezing water, boiled with great violence. Upon taking it from the ice, it ceased to boil, and began again, when it was put into the ice.

He said, that he had done the same thing with spirit of wine, and also with fair water, and that the bottle would boil by putting it into the ice, though it were neither shaken nor turned upside-down.

He was ordered to make the experiment with water at the next meeting, bringing his pneumatic engine with him, and exhausting the bottle before the Society.

January. 14. At a meeting of the COUNCIL were present,

	SAMUEL PEPYS, Esq; president
Dr. LISTER	Mr. WALLER
Mr. HILL	Mr. HALLEY
Mr. HOOKE	Mr. ASTON.
Dr. SLARE	

Dr. LISTER was sworn vice-president.

It was ordered, that the treasurer pay the following sums:

To Dr. PAPIN eighteen pounds, whereof fifteen pounds is for salary, and the other three pounds for a pneumatic engine, which he had made for the Society:

To Mr. WICKS fifteen pounds for a year and a half's salary:

To Mr. HUNT twenty pounds for half a year's salary: and

To the porter two pounds.

<sup>1</sup> This account is printed in the *Philos. Transf.* N<sup>o</sup>. 168. p. 880.

<sup>2</sup> This letter of Mr. LEEWENHOECK is printed in the *Philos. Transf.* N<sup>o</sup>. 168. p. 883.

It was ordered likewise, that the treasurer send for Mr. FOSTER, the person, who catalogued the books in the library, and advise him to be more moderate in his demands, and to attend at the next meeting of the council.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Dr. SLOANE was proposed a candidate by Dr. LISTER.

Mr. RICHARD WALLER presented a curious figure of the *cicindela vo'ans*, or flying glow-worm, which he had drawn by the microscope; and a box of the flies themselves, which had been taken the preceding summer at Northaw in Hertfordshire.

There were also read some observations by Mr. WALLER on the said flying glow-worm; which were ordered to be registered:

Concerning the light's expiring when the insect is dead, Dr. LISTER thought, that the contracting of the body might obscure the light.

Dr. SLARE said, that he had kept a glow-worm six days after it was dead, during which time the shining was discernible, but gradually decreased: and that the liquor separated from the body shined four or five hours.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, January 12, 1684, was read, mentioning, that there had been read at the last meeting of the Philosophical Society at Oxford Dr. LISTER's answer to a letter written some time before to him, concerning the colour of the liquor conveyed by the lacteals; in which answer he was willing to think, that the *humor refluus* might be partly of the nature of lymph; but that the greatest part of what fills the lacteals in sickly and empty animals seemed to be pituita, and sometimes bile: that he proposed a farther examination of the pellucid liquor contained in these vessels, particularly whether it be *lymph*, *pituita*, or water; which two latter are, he said, of less body and substance, and not so coagulable by the heat as the first, *lymph*; and he urged, that this *humor refluus* might be examined in icteric dogs or horses, where, he supposed, the gall was continually emptying itself no otherwise than the *ductus pituitarii* are in catarrhs; though indeed the *lymph* in such cases is, as he said, yellow: but he thought, that it would be found much yellower, because more immediately tinged, and with less mixture.

In this letter of Mr. MUSGRAVE was inclosed a paper, found in the study of Dr. SPEED, late of Christ-church, Oxford, and said to have been written by his father to Mr. BRIGGS. It seemed to be a description of one of CORNELIUS DREBBEL's inventions, and was as follows:

<sup>1</sup> They are printed in the *Philos. Transact.* N<sup>o</sup>. 167. p. 841. for January 1684.

<sup>2</sup> Letter-book, vol. ix. p. 340.

<sup>3</sup> SAMUEL SPEED, installed canon of Christ-

church in May 1674, and vicar of Godalmin in Surrey, where he died, January 22d, 1681.

<sup>4</sup> Mr. HENRY BRIGGS, professor of geometry at Gresham-college.

Mr.

" Mr BRIGGS, Notwithstanding my much business and troublesome observations, I have here sent you the under draught of the most strange work, that ever my eyes beheld. A gentleman being Dutch born, and dwelling at Ipswich, hath made a continual motion of this business and size as near as I could guess: the work is this, a ball or round globe, ever standing without moving, and upon the north and south sides a dial, within like unto a clock or some dial, both which moving and shewing the courses of the heavens, round about the east and west parts doth a ring or hollow trunk of crystal stand, and that without moving, and the same filled to half with fair water, which without any inforcement, that can be perceived, doth ebb and flow with the seas in every part of the world. Myself staid so long, that I saw it ascend up the trunk a great height, and left the lower compass of the ring empty. The man is very religious, and of an exceeding good repute of the inhabitants; and himself to me affirmed upon his faith, that it should so evermore, without any more help of man for hundreds of years, if it were not broken, and that both conjunctions and eclipses for many hundreds or thousands of years, if the world should continue, should be, and are therein seen now. This in great haste I remit thee to God. Shew this to Mr. LEEVEN, Mr. LUDWELL. From Ely this Sunday, June 3."

There was read a paper of experiments by Dr. LISTER about the freezing of several liquors and the difference between common fresh-water ice and that of sea-water: as also a probable conjecture about the original of the nitre of Egypt: which paper was ordered to be registered<sup>1</sup>.

Dr. LISTER presented the figure of a calculus grown upon a bodkin, drawn from the original in the King's closet, cut out of a child's bladder by Monf. COLO<sup>2</sup>:

Sir CHRISTOPHER WREN remarked, that according to the account of the seamen, who went northward, the ice is fresh.

He attributed the sudden growth of the stone to the magnetism of the iron.

Dr. ROBINSON remarked, that SISERUS mentioned a stone grown to an ivory bodkin.

There was also mentioned a case of a stone in the bladder growing about a piece of an iron nail.

Sir CHRISTOPHER WREN questioning, whether sapphires apply to the magnet, some pieces, that were in the repository, were tried, and applied, but others did not.

It was supposed by Sir CHRISTOPHER WREN, that the sapphire-stone is the rock, and the sapphire-gem the fluor.

<sup>1</sup> Register, vol. vi. p. 165. It is printed in *Philos. Transact.* N°. 167. p. 836. for Jan. 1687.

<sup>2</sup> An account of this is printed in the *Philos. Transact.* N°. 168. p. 882. for Feb. 1687.

Dr.

Dr. LISTER observed, that Bristol stones are the effluvia of iron mines.

Upon mentioning the different natures of iron, it was said, that the present iron would not cut porphyry.

Sir CHRISTOPHER WREN affirmed, that porphyry was to be cut now as well as formerly; but that it would wear out a great many tools, and that the workmen must take but little strokes.

He said likewise, that he had made gravers of damask steel: that if it have a white end, it sputters away like gun-powder: that it must have a red given it like copper, and be suffered to cool in the air.

Dr. PAPIN shut up water and spirit of wine *in vacuo*, and shewed the boiling of them, when put in ice. His account of this experiment was as follows:

"The musty lime-juice shut up *in vacuo*, that was seen in the last meeting, having been kept so for six days together, and set a boiling several times, to know whether by this means, it might lose its musty taste, it hath been taken out, and found nothing better than before: so that the best way to have lime-juice always fresh and good would be to shut it up *in vacuo*, as soon as it is drawn: for so it will keep for several years, without any multitudes or corruption, far beyond all that, which is commonly sold in the shops.

"Being commanded to shew my way for shutting up lime-juice, or other liquors *in vacuo*, either to keep them fresh, or to set them a boiling with ice instead of fire, I have brought all necessaries to shut up water in a pint bottle; and I have also brought some spirit of wine already shut up *in vacuo* in a glass bolt-head, that the Society may observe the different effects of these two liquors, when they shall be set a boiling, with ice instead of fire; but if I were to shut up liquors *in vacuo* in great quantities, and in great vessels, to make a trade of it, I would use another contrivance, which I will shew to the Society another time, if they please."

January 21, Dr LISTER vice-president in the chair.

Upon mentioning the light of the glow-worm situated at the end of the tail, Dr. LISTER said, that it might be akin to the phosphorus, which is made of urine: and that the shining of rotten fish might be the fish turning urinous. He mentioned likewise, that the King made Dr. GODDARD's drops of silk.

There was read the former part of a letter of Mr. LEEUWENHOEK to the Society, dated at Delft, January 5, 1685, N. S. It contained the figures and descriptions of several salts found in vinegar and in a sort of French wine called *vin de*

*damoiselle*; the figure of an eel in vinegar; the figure of the salts found in vinegar mixt with crabs eyes and chalk.<sup>2</sup>

There was presented from Mr. JOHN BEAUMONT a set of the iron instruments used then in Somersetshire for the splitting rocks with gun-powder, viz. the borer, the gun, and the wedge, together with a description in writing of the use of them<sup>3</sup>.

Mr. CRISP remarked, that the instruments used at Civita Vecchia were twice as big.

He likewise described the alum works there; and observed, that they had no need of kelp or urine: that their alum was different from ours, that which was used in their wines being white: that the iron used in England in copperas is only to answer the stirring it about: and that it makes copperas fouler, and bear a less price.

Dr. LISTER said, that there were several sorts of alum: that the Roman exceeded ours: that ours would not answer the uses, for which it was prescribed by the ancient physicians.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, January 17, 168<sup>+</sup>, was read, mentioning, that he had received a letter from Mr. CHARLES LEIGH containing an account of some remarkable things in Lancashire, as an earth preserving several things, that lie in it, from rotting; a fish with a prickle on the back, making the parts wounded with it to gangrene; which fish was thought to be the draco marinus; and golden marcasites, each about a quarter of a yard in length.

Mr. MUSGRAVE's letter mentioned likewise, that there had been some discourse at the Philosophical Society at Oxford concerning the barometer's being used as a level, to discover the difference between the several heights of places distant from each other.

This letter was accompanied with the extract of another, sent from Nîmes in France by THOMAS BENT, M. A. lately of Lincoln-college in Oxford, to STEPHEN WELSTEAD, M. A. of Merton-college, containing an account of the manner of making turpentine, distilling oil of turpentine, making tar, rosin, and pitch near Marseilles. The extract of Mr. BENT's letter was as follows<sup>4</sup>:

"Five leagues from Marseilles are very high mountains, which are (for the most part) covered with forests of pine-trees, which there grow wild: half a league out of the road, you see the making of pitch, tar, rosin, and turpentine, which is thus, viz. In the spring-time, when the sap runs most, they pare off the

<sup>1</sup> This letter is printed in the *Philos. Trans.* N<sup>o</sup>. 170. p. 963. for April, 1685.

<sup>2</sup> Ibid. N<sup>o</sup>. 167. p. 854. for January 168<sup>+</sup>.

<sup>3</sup> Letter-book, vol. ix. p. 343.

<sup>4</sup> Ibid. p. 344.

" bark

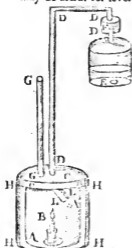
“ bark of the pine, to make the sap run down into an hole, which they cut at the  
 “ bottom to receive it. As it runs, it leaves a crain or crust behind it, which they  
 “ rake and temper in water, and vend by a cheat for white bees-wax, that they  
 “ make flambeaux of, and is a great deal dearer : then they take up the juice in  
 “ spoons from the bottom, and after they have so got a good quantity, they  
 “ strain it through a grocer's basket, such as they put up their Malaga raisins in,  
 “ that, which runs through easily, is the common *turpentine*. Then they take that,  
 “ which remains above, and adding a sufficient quantity of water, distilled in an  
 “ alembic, that which is so distilled is *oil of turpentine*, and the calx, that remains,  
 “ is common *resin* : then they cut the stock of the tree into large chips, and pile  
 “ them hollow in a cave, covering it on the top with tiles, but so as to let some  
 “ air come in to feed the fire : then burning them there runs a thick juice down  
 “ to the bottom, where they make a small hole for it to run out at (a larger hole  
 “ would set it all in a flame ;) and that which so runs out is *tar* : then they take  
 “ off that, and boiling it gently over again to consume more of the moisture, they  
 “ set it to cool, which when cool is pitch.”

It was conceived to be a mistake, that any part of the turpentine could be sold for white bees-wax, the smell being so different, though it was said to be used by the wax-chandlers in making up their candles.

Dr. ROBINSON remarked, that he had seen in France a gum or pitch made of the juniper tree, which is the *oxycydrus*.

Dr. PAPIN shewed a convenient way of keeping a candle burning under water. His account of it was as follows :

“ Having newly tried a very convenient way to keep a candle burning under water, I make bold to present it to the Royal Society, because I believe it may be useful for several experiments.



“ AA is a glass vessel.

“ B is a candle burning in the fame.

“ CC is a cover exactly fitted to the said vessel.

“ DDDD is a crooked pipe, that makes the communication between the said vessel and a pair of bellows.

“ FF is a pair of bellows with two valves, one in E, and the other in F, fitted to let the air pass from the bellows into the vessel AA, and keep it from returning back.

“ GG is a strait pipe to let out the air from the vessel AA, when new air comes in from the bellows.

“ HHHH is a metal plate to fasten the cover CC to the vessel AA.

“ LL is a plate to keep the wind, that comes thorough the pipe DDD from blowing out the candle.

Register, vol. vi. p. 204.

“ Now

" Now it is plain, that a man may with one hand hold the pipes DD GG. and let the vessel AA into the sea, with the candle burning in the fame: and though the pipes be very long for to let the vessel to a great depth into the water; yet the flame shall never want fresh air, as long as the man plays the bellows with his other hand. This engine may serve for most of the uses, that the hon. Mr. BOYLE has ascribed to the *phosphorus* in his book about the aerial noctiluca, as for to avoid the blowing of a ship, or for drawing fishes together in the night-time: but it may also be very useful to try what bodies are apt to corrupt the air. I have brought the instrument ready made, that the Royal Society may see how well the candle doth burn under water, when I play the bellows, and how quick the flame will go out, when I leave off blowing."

The Lord Vaughan was unanimously elected a fellow of the Society.

Dr. SLOANE was likewise elected fellow.

January 28. Dr. LISTER vice-president in the chair.

The latter part of Mr. LEEWENHOECK's letter to the Society of January 5, 1685 was read, concerning the various figures of salt in Moselle wine, Sherry, Hockamore, Pincow, Garence, Goteau, Toulain, Citereuse, and high Country wines: as also the figures resulting from the mixtures of tartar, crabs eyes, or chalk with several wines; the difference of the figures of the salts found in wines from the salts found in chalk stones bred by the gout, &c.

Dr. LISTER remarked, that Mr. LEEWENHOECK gave a new explication of the effects of chalk on vinegar, viz by making the salts go together, which were before dispersed: and that some salts were made flexible, which he had never seen.

A letter of Dr. TANCRED ROBINSON was read, containing some observations on some boiling fountains at Peroul in Languedoc, caused by some streams rising out of the ground, which were not inflammable: as also upon the variety of exhalations in other places, as well caused by the pyrites and lapis calcaris, as at some places in the kingdom of Naples, or by other subterraneous bodies<sup>\*</sup>:

Dr. LISTER presented from the Earl of Clarendon a parcel of ores from New England, viz.

1. Lead ore mixed with yellow and green copper ore.
2. Glauis ore of lead, two pieces.
3. Black lead.
4. Pyrites or marcasite, being iron stone, three pieces.
5. Talc with a kind of black granites in it.
6. An earth like umber

<sup>\*</sup> Register, vol. vi. p. 166. These observations are printed in the *Philos. Trans.* N<sup>o</sup>. 163. p. 92. for March 1685.

7. Hexagonal spars, three pieces.
8. Hexagonal crystals Ifabella coloured.
9. Pebble transparent.
10. A large column of spar doubly hexagonals, that is six large and equal planes, of which every edge is terminated by a small plane. These small planes are all equal too.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, January 27, 1687<sup>a</sup>, was read, mentioning, that the Philosophical Society there had provided a measure of a cubic foot for the making of experiments; and had begun a correspondence with Dr. MIDDLETON, provost of King's-college in Aberdeen: that at the last meeting of the said Society answers had been made to Sir WILLIAM PETTY's 39th and 2. th queries, as follows:

"In answer to the 39th query of Sir WILLIAM PETTY's catalogue lately printed at Dublin, (which query runs thus, viz. How many shoes of a certain size a shoe-maker can make up in a time given?) it was affirmed in our last meeting, that childrens shoes reach from *ones* to *twelves*; the five first of which sizes are called *childrens pumps*; of which a shoe-maker can make twelve pair in a day: four pair of childrens *eights* are a day's work. Womens shoes and mens shoes begin at *ones*, and end the former at *elevens*, the latter at thirtens, inclusive; of women's, or men's, sizes (speaking still in the shoe-makers terms) three shoes or two pair are an ordinary day's work; taking leathern heels with wooden heels; of which the former (viz. leathern heels) require about an hour more in working than the latter.

"A shoe-maker in this city can make four pair of mens *sizes* in a day; and has done it frequently; which is looked upon to be a strange thing.

"The twentieth query of the aforesaid catalogue gave occasion to the following observation; 80 lb. of pit-coal (brought to this city from Wedgbury in Gloucestershire) kindled at several firings, with 4½ lb. of charcoal, gave a little above ½ this of a peck of ashes, which weighed 4½ lb. averdupois; besides which ashes, about a pound of the pit-coal was left unburnt in the grate: so that a pound of this sort of pit-coal (well burnt) does not leave an ounce of ashes."

A letter of Mr. DAVIS of Leake in Nottinghamshire to Mr. ASTON., dated January 20, 1687<sup>b</sup>, was read, concerning the *Sypho Wirtembergicus*: which letter was delivered to Dr. PAPIN to report how far it agreed with the experiment shewed to the Society.

Mr. HOOKER shewed a piece of serge, which one Mr. HASKINS in Jewen-street had caused to be watered as silks used to be.

He shewed likewise a draught of Mr. SMETHWICK's engine for grinding

<sup>a</sup> Letter-book, vol. x. p. 10.

<sup>b</sup> Ibid. p. 6,

glasss;

glasses; for which Mr. SMETHWICK had a patent granted him. This draught was delivered to Mr. HUNT in order to take a copy of it.

February 4. A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, January 31, 1687<sup>1</sup>, was read, containing an answer to Sir WILLIAM PETTY's query about mortar and plaister, as follows:

" Sir WILLIAM PETTY's queries concerning the proportion of the materials used in making several sorts of mortar have given occasion to one of our company to present us with the following informations: The plaister used by our plaisterers here in Oxford is generally of two sorts, coarse and fine. 1. Coarse mortar is made of lime, sand and hair; the lime used here is of two sorts, viz. 1. Chalk-lime, made of a chalk-stone, dug at Nettlebed, &c. and burnt: 2dly, hard stone-lime, which is made of hard rag-stone burnt: this last sort of lime is much stronger, and will go two yards square in five farther, (for it takes up a far greater quantity of sand and water,) than the former, which is the finer of the two, and the more glorious to the eye. One bushel of chalk-lime, one bushel of sand, and one peck of hair, mixt all together, with water, will make coarse mortar: but if you use hard stone-lime, then one bushel of lime will require a bushel and a half or two bushels of sand, and a bushel of hair. 2dly, In the making of fine mortar, mix one bushel of chalk-lime with half a peck of hair, or a bushel of hard stone-lime with a peck of hair, and as much water as is necessary. Coarse mortar is used next to the lathing, stone, or brick-wall; fine mortar is drawn on the other, and makes it white and beautiful.

" Clay-mortar or loam-mortar is made with clay and as much chopt straw, as the clay will take in, by the help of water. Whiting is made by dissolving Spanish white, either in size, or in water; that with size is not easily rubbed off.

" The substance commonly sold in London for Spanish white is supposed to be chalk ground, and made up into lumps with water:

" It is not affirmed, that the forementioned rules are universally true; but only, that they are observed by some men in this place.

" It was asserted, that Spanish white, dissolved in four milk, will make whitening as apt to stick, as if it were made with size."

Mr. RICAUT mentioned the goodness of the plaister used by the Turks, with which they line and smear over the insides of their aqueducts; which, he said, was the same, that was used by the Greeks 1600 years before, being a composition of lime, oil, and ground brick.

A paper of Mr. WALKER communicated by Mr. MUSGRAVE<sup>1</sup>, was read,

<sup>1</sup> Letter-book, vol. x. p. 12.

<sup>1</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 167. p. 856.

being an account of several experiments made at Oxford with the model of a waggon, whereof the lesser wheels were  $4\frac{1}{2}$  inches high, the bigger wheels  $5\frac{1}{2}$  inches high. There were also two more wheels of  $5\frac{1}{2}$  inches high to be used instead of the lesser sort.

The inference from the experiments was, that a waggon in a rough way might be drawn more easily, if it had four equally high wheels, and the thills were fixed under the axis.

It was desired, that Sir ANTHONY DEAN and Mr. HOOKE would peruse the paper, and give their opinions of it: and the secretary was ordered to communicate it to them.

Dr. PAPIN remarked, that Mr. BOYLE conceived, that the apparatus for keeping a candle under water might be useful for drawing of spirit of sulphur, provided candle would burn, when the pipe, that is to carry out the air, was placed towards the bottom of the glass. Upon trial it was found, that the candle would burn very well.

He likewise shewed, that equal parts of the same spirit of wine might be put in two glasses, and one glass might boil *in vacuo*, the other not. It appeared, that the spirit of wine had been exhausted in one glass; and that half of it being afterwards poured into another glass had gathered the air, which boiled out.

His account of these two experiments was as follows:—

“ Having shewn to the hon. Mr. BOYLE the instrument to keep a candle burning under water, he thought it might be very useful to draw the spirit of sulphur, and to receive the *effluvia* from any other body actually inflamed; because the vessel being all surrounded with cold water, the spirits might condense the sooner, especially if the tube, by which the air gets out, should reach towards the bottom of the vessel, because then the fumes tending first upwards, and afterwards going down, might be condensed before they could find the way to get out. I did therefore make the pipe for the air to get out so long, that it reached near to the bottom of the vessel, wherein a burning candle was included: but I found it impossible to keep a flame shut up in this manner, and the candle went out in a very short time, although I did play the bellows with all possible diligence: so that to remedy this inconvenience, it should be necessary to find out the cause of the flames going out, whilst it doth receive a constant supply of new fresh air. I have brought the instrument to the Royal Society, to receive their directions about it.

“ I have also made an experiment, that may at first seem very surprising, that two glass vials, like one another, containing the same liquor, and included in the same receiver, at the same time, the one will boil with great violence, and the other will not stir at all; and thought I might shew it to the Royal So-

Regist. vol. vi. p. 206.

“ cicty,

"ciety, because being attentively considered, it may perhaps give some light into the nature of the particles of spirit of wine."

A letter from St. Andrew's\* was read, giving an account of some books printing at Edinburgh, and of a way of purifying the air in mines; which was, that the miners carried down a candle in a dark lantern, covered with a wet cloth; and that then lying prostrate on the ground, they in that posture kindle and maintain a fire in the mine, which cleanses it without injuring them, &c.

There was likewise read a paper of experiments made at Oxford with a cubical vessel of well seasoned oak, the measure of a foot being first examined by the university standard; the weights made use of being the university standards, the scales large, and turning with two ounces.

A letter of Mr. THOMAS MOLYNEUX to Mr. ASTON, dated at Leyden, Feb. 13, 1687, N. S., was read, giving an account of Mr. LEEWENHOECK's microscopes, as follows:

"I have hitherto delayed answering your last, because I could not give you an account of Mynheer LEEWENHOECK; but last week I was to wait upon him in your name: he shewed me several things through his microscopes, which 'tis in vain to mention here, since he himself has sent you all their descriptions at large. As to his microscopes themselves, those, which he shewed me, in number at least a dozen, were all of one sort, consisting only of one small glass, ground, (this I mention because 'tis generally thought his microscopes are blown at a lamp, those I saw, I am sure, are not) placed between two thin flat plates of brass, about an inch broad, and an inch and a half long. In these two plates there were two apertures, one before, the other behind the glass, which were larger or smaller, as the glass was more or less convex, or as it magnified. Just opposite to these apertures on one side was placed sometimes a needle, sometimes a slender flat body of glass or opaque matter, as the occasion required, upon which, or to its apex, he fixes whatever object he has to look upon; then holding it up against the light, by help of two small screws, he places it just in the focus of his glass, and then makes his observations. Such were the microscopes, which I saw, and these are they he shews to the curious that come and visit him: but besides these, he told me he had another sort, which no man living had looked through setting aside himself; these he reserves for his own private observations wholly, and he assured me they performed far beyond any, that he had shewed me yet, but would not allow me a sight of them, so all I can do is barely to believe, for I can plead no experience in the matter. As for the microscopes I looked through, they do not magnify much, if any thing, more than several glasses I have seen, both in England, and Ireland: but in one particular, I must needs say, they far surpass them all, that is in their ex-

\* Letter-book, vol. x. p. 15.

\* The account of these experiments is printed in the *Philos. Transact.* N<sup>o</sup>. 169. p. 926. for

March 1685.

\* Letter-book, vol. x. p. 1.

"treme

“treme clearness, and their representing all objects so extraordinary distinctly. For I remember we were in a dark room with only one window, and the sun too was then off of that, yet the objects appeared more fair and clear, than any I have seen through microscopes, though the sun shone full upon them, or though they received more than ordinary light by help of reflective specula or otherwise: So that I imagine 'tis chiefly, if not alone in this particular, that his glasses exceeds all others, which generally the more they magnify, the more obscure they represent the object; and his only secret, I believe, is making clearer glasses, and giving them a better polish than others can do. I found him a very civil complaisant man, and doubtless of great natural abilities; but, contrary to my expectations, quite a stranger to letters, master neither of Latin, French or English, or any other of the modern tongues besides his own, which is a great hinderance to him in his reasonings upon his observations; for being ignorant of all other mens thoughts, he is wholly trusting to his own, which, I observe, now and then lead him into extravagancies, and suggest very odd accounts of things, nay, sometimes such, as are wholly irreconcilable with all truth. You see, Sir, how freely I give you my thoughts of him, because you desired it.”

This letter contained also a farther account of the prodigious *os frontis* in the medicine school at Leyden<sup>1</sup>.

Dr. PAPIN shewed a way, by which filtrations through cap-paper might be made suddenly and with great quantities of liquor by the help of the pneumatic engine. There being a pipe from the strainer to the exhausted receiver, the liquor was driven forcibly by the weight of the air. It was tried with a solution of sugar in water, which became very clear. His account of it was as follows<sup>2</sup>:

“Filtrations through cap-paper being of great use, for the clarification of several juices and solutions, but being so tedious, that they can hardly be applied to great quantities, I have endeavoured to apply the pneumatic engine, to hasten such an operation, and I have succeeded pretty well, by the following contrivance.

“AA is a glass-receiver.

“BB a cover fitted to the same.

“CCC is a pipe, that makes the communication between the receiver AA, and the pneumatic engine.

“DD a shallow vessel full of little holes.

“EEE a pipe, that makes the communication between the vessel DD, and the receiver AA.

“FF a vessel to contain the liquor to be filtrated.

“GG the plate of the pneumatic engine.

<sup>1</sup> This part of Mr. THOMAS MOLYNEUX'S letter is printed in the *Philos. Transact.* N°. 168,

p. 581.

<sup>2</sup> Register, vol. vi. p. 207.



" Another raw egg of the same sort	— — — — —	3ij	—	3j	—	3ij	gr. xiiij.
" The same egg boiled	— — — — —	3ij	—	3j	—	3j	gr. xvij.
" Loft in boiling	— — — — —	oo	—	oo	—	oo	gr. xv.
" The skin	— — — — —	oo	—	oo	—	oo	gr. xiii.
" The shell	— — — — —	oo	—	3j	—	3ij	gr. xix.
" The yolk	— — — — —	oo	—	3v	—	oo	gr. vij.
" The white	— — — — —	3j	—	3ij	—	oo	gr. xij.
<hr/>							
" Loft in weighing	— — — — —	oo	—	oo	—	oo	gr. v.

" These experiments were tried with a pair of scales, which turned with half a grain, and are designed as part of an answer to one of Sir WILLIAM PETTY's queries."

A discourse was read, sent by Mr. WILLIAM MOLYNEUX, concerning the bogs and loughs of Ireland, written by Mr. WILLIAM KING, fellow of the Dublin Society\*. The cause assigned of these bogs was the want of industry, the springs raising up gradually a plexus of heath and grafs, the bottom under the water being a white clay or sandy marl. The inconveniences of them are spoiling communication, destruction of cattle, sheltering rogues, and corrupting the air and waters.

The ways of draining them are cutting trenches, and deepening them by degrees, till you come to the bottom.

Dr. LISTER was of opinion, that the discoloured water coming from the bogs, might be from the flower of the heath falling into the water.

A letter of Mons. JUSTEL to Mr. ASTON", concerning some inventions at Paris; a curious perspective of a hall; a candlestick snuffing its own candles; an invention to estimate the way of a ship; a stove for warming several chambers; and an account of several books printing at Paris.

Mr. PAGET presented Dr. BARROW's posthumous lectures.

Dr. PAPIN shewed several sorts of gellies, which he had filtrated and made fine by means of the pneumatic engine, according to the method approved of at the last meeting. His account of these experiments was as follows:

" Having shewn in the last meeting the good effect of the instrument for filtrations, I hope the Royal Society will be pleased to see a real and great use it may be applied to, for making gellies extraordinary fine, and at a cheap rate: I have therefore brought hither three sorts of gellies: the first seasoned with sugar, and near as fine as ordinary gellies, commonly sold for two shillings a pound: and yet this may be afforded for a groat: the second gelly

\* This discourse is printed in the *Philos. Transact.* N<sup>o</sup>. 170. p. 948. for April 1685.

† Letter-book, vol. x. p. 7.

‡ Register, vol. vi. p. 203.

“ seasoned

“seasoned with sugar, lemon juice, and white wine, and fully as fine as ordinary gellies are, may be sold for two groats a pound: the third gelly much finer than the former, and seasoned with sack instead of white wine, may be afforded for a shilling the pound, though it were aromatized with some essential oil. So that both rich and poor, either for health or pleasure, may receive a great benefit from this invention.”

Mr. Hooke read a paper concerning the different ways of carriage, which there are upon land and water.

February 25. Upon reading the minutes of the last meeting concerning the black water running from bogs, Sir CHRISTOPHER WREN was of opinion, that the colour came from the sand.

A letter was communicated by Dr. LISTER, written by Dr. SAMUEL THRAPLAND, and dated at Hallifax, February 2, 168 $\frac{1}{2}$ , concerning a carpenter there, having voided by stool two large stones at a fortnight's distance. The stone first voided was shewn, and appeared to consist of two different substances; the one more hard, and bright, and angled; the other more black and friable, encompassing the former. The stone had been something diminished by being carried about, but it seemed about an inch and half every way. It was delivered to Mr. HUNT to take the figure of it, and keep it till it was called for.

Sir CHRISTOPHER WREN supposed it might be bred from the cystis fellea, descending into the guts; and moved, that it might be tried, whether it would dissolve in the juice of garlic.

Dr. SLOANE said, that he had seen 200 stones taken out of the gall bladder of a lawyer at Montpellier; and he judged them to be of a like substance with this. This opinion was farther confirmed by cutting a little off with a knife.

Dr. LISTER communicated another letter to himself from Mr. H. GYLES, dated at York, February 10, 168 $\frac{1}{2}$ , together with the form of an urn lately found at the brick-kilns without Barthant bar; the urn itself being sent to Mr. WALKER of University-college in Oxford. The figure was delivered to Mr. HUNT to be copied.

A petition was read from one ROBERT COLLINSONE, a Scotchman, desiring to shew the Society a very large stone taken out of the bladder of one FRANCIS DUGORD of Auchen-home in Aberdeen, weighing 35 ounces and  $\frac{1}{2}$ , being in length 5 inches  $\frac{3}{4}$ , diameter 3  $\frac{1}{8}$ . The man, in whom it was bred, lived till he was fifty years old. It was delivered to Mr. HUNT to make a draught of it; and the man, who brought it, was ordered ten shillings.

<sup>v</sup> Letter-book, vol. x. p. 4. It is printed in this letter is printed in the *Philos. Transact.* N°. the *Philos. Transact.* N°. 170. p. 961. 171. p. 1017.

<sup>z</sup> Letter-book, vol. x. p. 20. An extract of

Mr. BAILEY shewed a curious letter, which had been formerly sent by the King of Tiwan. It was written upon yellow paper, having several gold-coloured spots. The characters were Chinese, and some of them seemed to consist of eighteen and twenty four different strokes, or takings-off of the pen.

A petition was read from Mr. JOSHUA HASKINS, representing, that whereas he had invented a new way of improving woollen manufactures by impressing thereon certain indented lines or creases resembling the watering of tabby or mohair; he desired the Society to take into consideration this invention of his, and to judge of any fraudulent pretences concerning the manner of it; and upon full proof before them of the newness of the invention, to give him an attestation.

The Society taking into consideration this petition, appointed Sir CHRISTOPHER WREN, Sir JOHN HOSKYNs, Mr. HENSHAW, Mr. EVELYN, Mr. HOOKE, and Mr. HOUGHTON, or any three of them, to be a committee for the examining the invention, and to bring their report in writing to some meeting of the Society.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, Feb. 21, 186 $\frac{1}{2}$ \*, mentioning, that wheat for twenty years past had been sold at Oxford at a mean rate, 5 s. 4 d.  $\frac{1}{2}$  a bushel, and malt at 2 s. 11 d.  $\frac{1}{2}$  a bushel :

That Mr. LEIGH had written to him, that he had twelve cubical pebbles taken out of the omentum of a cow :

That Mr. COLE had written, that he had seven colours from the shell-fish, of which he promised patterns :

That Dr. BRIGGS had met with another nyctalops in Bedfordshire.

A letter of Mr. ISAAC NEWTON to Mr. ASTON, dated at Cambridge, Feb. 23, 168 $\frac{1}{2}$ \*, mentioning, that the design of a philosophical meeting there had been pushed forward by Mr. PAGET, when he was last there; with whom himself had concurred, and engaged Dr. MORE to be of the Society; and that others were spoken to, partly by him, and partly by Mr. CHARLES MONTAGU†. "But that, *added he*, which chiefly dashed the business, was the want of persons willing to try experiments, he, whom we chiefly relied on, refusing to concern himself in that kind. And more what to add farther about this business, I know not, but only this, that I should be very ready to concur with any persons for promoting such a design, so far as I can do it without engaging the loss of my own time in those things.

"I thank you for entering in your register my notions about motion. I designed them for you before now; but the examining several things has taken a greater part of my time than I expected, and a great deal of it to no purpose: and now I am to go into Lincolnshire for a month or six weeks. Afterwards I intend to finish it as soon as I can conveniently."

\* Letter-book, vol. vi. p. 27.

† Ibid. p. 28.

\* Afterwards Earl of Halifax.

† Vol. vi. p. 218.

Dr. ROBINSON acquainted the Society, that Mr. RAY having some time since finished and fitted for the press Mr. WILLUGHBY's history of fishes, would put it into his hands, to be brought to the Society,

It was thought proper, that the secretary should write to Oxford, to know how the bishop \* might be disposed to take care of printing it upon the Society's taking off an hundred copies.

Dr. PAPIN considering the experiment of Mr. KUNCKEL, that spirit of wine and water grow hot by being mixt together, made trial how spirit of wine purged of air, and water purged of air, would do, if they were mixt *in vacuo*. It appeared, that upon the mixture there arose an ebullition; and he said, that new air was always found in the receiver, which depressed the gage, though in the trial it seemed, the engine was not tight. This air, he supposed, was thrust out of the mixture, by reason of the greater congruity between them and the aerial particles: and he concluded, that the heat in Mr. KUNCKEL's experiment might not come from an acidity in spirit of wine, but from expelling the air, when the two liquors unite.

March 2. Dr. LISTER vice-president in the chair.

Upon reading the minutes of the last meeting, Dr. LISTER and Dr. ROBINSON confirmed, that the erica being in the flower about the month of August, the waters running from the place are discoloured and shew like thick ale.

Concerning the stones voided from the intestines, Dr. LISTER conceived them first bred in the vesica fellea: that the growing or shooting of stones is instantaneous, as might be perceived by a stone in the repository, presented by Dr. GREW; which, as it was broken, shewed plainly shooting of the lines from the center to the circumference, in the same manner as one sort of gypsum is radiated.

He likewise observed, that in the urn mentioned from York, the face and other parts were shaded or touched with a red varnish, the colour observable in the best urns; which shews, that those urns have been varnished; as is mentioned in the *Philosophical Transactions*.

He also said, that Mr. CONYERS the apothecary conjectured, that the jet-rings or bracelets found in urns were rolls to be worn on womens heads. And this was remarked to be the opinion of BARTHOLINUS in his book *De Annulis*.

Dr. ROBINSON observed, that Cavalier Pozzo at Rome had twenty five sorts of these rings of several metals; and that they were for the head.

Upon mentioning Mr. COLE's purple fish, the secretary was desired to write to Oxford to request, that a shell of the fish might be sent up.

\* Dr. JOHN FELL.

B b b 2

Mr.

Mr. ASTON produced a large piece of brown sugar, delivered to him by Monf. JUSTEL. It was said to be made by the savages of Canada, who at the time, when the juice rises in the maple (*l'érable*) let it out, and evaporated it to an eighth part; at which time it was said to be as sweet as the sugar from the sugar-canes.

Mr. ASTON was desired to send a piece of the sugar to Mr. RAY, and also to Oxford, intimating, that the Society would be glad to have the experiment made by them, this being about the time that the sap rises; and that if the sap will not granulate without it, there may be used lime-water.

It was said, that at Brocklesby in Lincolnshire there were sycamores planted in HENRY VII's time, which are bigger than any trees in the lordship, though the leaves were as small as the common maple.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, Feb. 28, 1687, was read, mentioning some antiquities, which the Philosophical Society there had lately received; a farther description by Mr. BULKLEY of the monster with two heads; a book written by Mr. DALGARNO, and printed some years before, but scarce yet published, *peri ignium* or the several ways of communicating thoughts; a man, who died mad in Cheshire, having been bitten by a mad cat, which received its madness from the bite of a mad dog.

A letter of Mr. R. HOWMAN of Norwich to Dr. BRIGGS was read, concerning one Alderman PARMITER of that town, who having been bitten by a mad fox, about six weeks after grew paralytic, and at last fell into an hydrophobia, of which he died.

Dr. LISTER took notice, that this case differed from one, which he had described, in that here was a palsy; but he said, that this did not hinder the person's drinking, for his patient swallowed quicker than another man. The intermitting of the pulse on one side he took to be accidental. He remarked, that GALEN had written, that no animal was mad but the dog-kind, or what was bitten by them.

Dr. PAPIN shewed a strong extract of liquorice and water made in his digester; as also a composition made with this extract and the gelly of bones, being very pleasant, solid, and dry, as to be carried about, and easily melting in the mouth. His account of this was as follows:

" Having seen several preparations of juice of liquorice, that shew the usefulness of it, I thought it would be worth while to improve such a preparation by means of the digester. I did therefore fill up a glass pot with liquorice roots and water: and having included it in the digester, I increased the fire, till the drop of water did evaporate in two seconds, and I found, that the water in the pot had acquired a red darkish colour, and that in five or six hours time,

<sup>1</sup> Letter-book, vol. x. p. 44.

<sup>2</sup> Register, vol vi. p. 210.

" it did coagulate, because of the great quantity of glutinous juice, drawn from  
 " the liquorice by such a strong operation. I have brought some of the said  
 " *coagulum*, that the Royal Society may be pleased to observe the nature of it. I  
 " did afterwards mingle some of the said juice with gelly of bones, and having  
 " set it drying, it became a pretty dry transparent substance, that may be folded  
 " up in a paper, and carried in one's pocket, without any danger of melting or  
 " putrifying: but being put in the mouth, it melts down, and hath a strong  
 " and pleasing taste of liquorice, far beyond any that hitherto hath been made:  
 " I have therefore brought some of it: and I have at the same time brought ano-  
 " ther sort, which is kept as a great secret, and is sold at six pence an ounce: so  
 " the Royal Society may compare them both, and see the difference between that  
 " and mine."

Mr. HOOKE read a paper about SIMON STEVIN's sailing chariot and other sorts of motion<sup>b</sup>.

March 11, Dr. LISTER vice-president in the chair.

MONS. DE BLEGNV, surgeon to the French King, being permitted to be present, presented his works to the Society, containing thirteen tracts.

MONS. DE FOURCY was permitted to be present at the desire of MONS. JUSTEL.

Dr. ROBINSON presented Mr. WILLUGHBY's and Mr. RAY's history of fishes in manuscript, ready for the press, which was put into his hands again till it could be printed.

Mr. ASTON read a letter to himself from Dr. PLOT, dated at Oxford, March 3, 1687<sup>1</sup>, mentioning, that the Bishop of Oxford would be willing to print Mr. WILLUGHBY's and Mr. RAY's history of fishes, provided, that the book were intire as to the matter and the figures, and that the Society would take off 100 copies.

It was desired, that Dr. LISTER would give some instructions concerning the number of the figures, that would be necessary, and out of what books they might best be had.

A letter was read from Mr. WILLIAM MOLYNEUX to Mr. ASTON, together with the minutes of the Dublin Society from December 1, 1684, to February 23, 1687<sup>2</sup>, inclusive; which minutes were as follow<sup>b</sup>:

" Dec. 1. A letter was read from Mr. K. concerning the trisection of an angle after  
 " method, though mechanical, yet more plain and facile, than has yet been pro-  
 " posed. It also contained mechanice sectiones anguli cujuslibet in partes  
 " quolibet. As likewise it intimated various other curiosities, which he had under  
 " consideration, and some of them finished, as a Philosophical character, the 2d

<sup>b</sup> It is printed in the *Philos. Experiments and Observations*, p. 150.

<sup>1</sup> Letter-book, vol. x. p. 54.  
<sup>2</sup> Ibid. p. 38.

" book

“ book of EUCLID, &c. On the account of this philosophical character, much discourse passed about various attempts that way. An eclipse of the moon being expected the 11th of this month, it was ordered it should be calculated and observed. Mr. MOLYNEUX promised to do something therein. Dr. MULLEN collected the serum in a blister raised by a blistering plaster, in which he tried these experiments: it ferments not with spirit of wine, nor with common spirit of sal armoniac; but with a peculiar sort of spirit of sal armoniac of the doctor's own preparation, it fermented visibly. This serum turned syrup of violets green. It did not coagulate milk put over a fire; three fourths of it evaporated, the residue remaining like a jelly.

“ Our president, Sir WILLIAM PETTY, brought in a paper, *supellex philosophica*, containing forty instruments requisite to carry on the designs of this Society. He likewise ordered, that hereafter, at every meeting, an experiment in natural philosophy should be tried here before the company, and that the president should appoint on the foregoing Monday, what should be tried the Monday following, and the persons to try it, that accordingly a fit apparatus may be made.

“ Ordered, that next Monday Mr. FOLEY expose the pulvis fulminans and its effects on a touched needle.

“ Mr. MOLYNEUX presented Sir R. SINBOLD's *Scotia Illustrata*; the *Philosophical Transactions* from March to July last, inclusive, and the *Acta Eruditorum Lipsie* from April to June last, inclusive.

“ December 8, 1684. A letter was read from Mr. MUSGRAVE, containing the minutes of the Oxford Society from October 28 to November 18. Therein was mentioned an experiment of producing light by Dr. PLOT. Ordered, that Dr. MULLEN try that experiment, and report it.

“ Mr. MOLYNEUX produced some pulvis fulminans, compounded at this rate, flores sulphuris, 2. Tartar, 3. Niter, 6. It performed very well. A touched needle was exposed to its blow; but it could not well be determined, whether it had lost its verticity thereby, by reason that the needle was but weakly touched by a weak stone, but it seemed rather not to have lost its verticity. Ordered, that this experiment be repeated the next meeting. Ordered also, that a pistoll-barrel be charged with this powder and bullet, and the breech thrust into the fire (the touch-hole being first stop't) to try its effects on boards placed before it. As also that it should be tried, whether this pulvis fulminans in its blow will fire gun-powder, match, spunk or dry linnen cloth, &c. The rest of our time was taken up in determining a controversy, which two persons had referred to our Society, concerning the lines or circles of longitude and latitude.

“ Dec. 15. The right hon. the Lord Viscount Montjoy was this day pleased to favour us with his company, and to be admitted into our Society. His Lordship proposed, that the bleaching or whitening of linen cloth, as practised “ in

" in this country and in Holland, should be taken into consideration and enquired into, that a matter of that consequence to this nation, especially to the northern parts thereof, should be advanced as much as possible.

" The pulvis fulminans composed the last Monday, being kept close in a glass bottle, performed this day very well. A piece of dried paper laid over it was only lightly scorched thereby, and such another piece laid over a like quantity of gun-powder was thereby set into a flame: the pulvis fulminans in its going off fired gun-powder. The pistol charged therewith was not yet tried.

" Mr. KING explained a contrivance of his for advancing Dr. PAPIN's digester.

" All the time of the moon's eclipse last week the sky was thickly overcast, so that no account thereof could be returned "

" Dec. 22. A letter was read from Mr. ASHE, in answer to a query sent down by the Society to him, concerning a man in his country, who had a constant and periodical evacuation of blood at the end of his forefinger. From which letter the following return is abstracted. WALTER WALSH, an inn-keeper in Trym, born in Ireland, of a temperate diet, sanguine complexion, and merry humour, in the 43d year of his age, anno 1658 about Easter, was seized with a great pain over all his right arm, a great heat and redness in his right hand, and a pricking in the point of the fore-finger, wherein there appeared a small black speck, as if a little thorn had run in, and supposing it such he opened it, and thereupon the blood spun out in a violent, but small stream. After it had spent its violence it would cease for a while, and only drop, and then spring out with violence again, continuing thus for twenty four hours, till at last he fainted away, and then the blood stanch'd of itself, and his pains left him. From that time during his whole life (which was twelve years) he was frequently troubled with the like fits, seldom having a respite of two months, and they never returned oftner than in three weeks; he seldom bled less than a pottle at a time. The oftner the fit came, the less he bled; and the seldomer it assailed him, he bled the more: whenever they endeavoured to stanch the blood, it rais'd most exquisite tortures in his arm; no remedies, that were ever used, proved in the least effectual. He had no other distemper, that troubled him; the seasons nor weather wrought not upon him; he had no outward accident, that at first brought the bleeding: drinking more than ordinary made him more apt to bleed. He had no child after his first seizure. These frequent fits brought him at last very low, inasmuch, that towards his latter end, he bled but little, and that too but like diluted water. He died of this distemper on the 13th of February, 1670.

" Jan. 12. A letter was read from Mr. ASTON, giving an account of the last elections in the Royal Society. To the other particulars of that letter this is returned, the scarcity of the Connaught worm will hinder us for a long time from making any farther experiments of its poisoning. Mr.

" Mr. BULKELEY's anemoscope and wine-pump were only propofals of what he thought may perform well in both, but the engines were never tried, or yet made.

" A letter was read from Mr. MUSGRAVE to Dr. LISTER concerning the limpidnefs of the liquor in the lacteals. Ordered, that the thanks of this Society be returned to the ingenious and learned Mr. MUSGRAVE for his communications.

" Dr. HUOLAGHAN propofed, that it may be enquired what is the moft nice way of difcovering the acidity of liquors. Hereupon our prefident gave us many of his thoughts, and amongft others, propofed a tincture of cochineal.

" On occafion of a relation concerning one MARY PARRY in the minutes of the Oxford Society, October 7, 1684, Mr. BULKELEY propofed, that Mr. POYNTER, a chirurgeon in Oxford, be defired to communicate an account of a bitch he opened, that contained in her the fetus of feveral impregnations; as alfo of a ftone, which he took from under the tongue of a shoemaker in Oxford.

" Order was then taken about a more commodious way for profecuting our experiments.

" Jan. 19. Dr. HUOLAGHAN prefented an account of a monftrous kidney, weighing forty ounces, lately taken from a perfon in this town, together with the delineations of it and its parts, accurately drawn.

" A letter was read from Mr. MUSGRAVE concerning the minutes of the Oxford Society, to which our thanks being returned, we promife to tranfmit thofe things they defire from us. Thanks alfo were ordered for the prefent of afbeflus paper, which, upon trial, fucceeded very well. The fame letter inclofed Dr. PLOT's difcourfe of perpetual lumps, and at this meeting we were diverted from reading it by a perfon, who brought us in a monftrous birth, being a female child with two moft compleatly formed heads on a body outwardly fingle in all other parts. The parties, who had the property in this monfter, would not fell it; otherwife we fhould have diffedted it.

" Jan. 26. The right hon. the Lord Vifcount Montjoy at this meeting prefented an air gun, which performed very well.

" Dr. PLOT's difcourfe of fepulchral lamps was read. Ordered, that the thanks of this Society be returned the doctor for this learned difcourfe.

" A letter was read from Mr. MUSGRAVE, giving an account of fome relations from Dr. TURBERVILLE of Salifbury.

" There was prefented a male child with two compleat heads, one fomething  
" bigger

“ bigger than the other, and three arms, the parents names PATRICK and ELI-  
 “ BETH HOY, farmer, in the county of Meath in the barony of Kels. The  
 “ mother about twenty four years old, this her first child, born this January day  
 “ , 11th. Of this we have an accurate sketch, but the bowels had been carelessly  
 “ taken out as soon as it was born. The people, that had it, said it had two hearts,  
 “ two livers, &c.

“ Dr. HUOLAGHAN shewed some experiments of changing the colours of li-  
 “ quors tinged with cochineel, syrup of violets, &c. in order to what he had for-  
 “ merly propofed concerning an accurate criterion of acids.

“ Dr. MULLEN produced part of the diaphragm of an old woman, to which  
 “ there grew an hydatides containing about half a pint of water: this was opened  
 “ before us; its liquor was of the colour of common ale, but it was full of fat  
 “ unctuous particles, which, when it was poured on any thing, did shine like  
 “ glittering sand on a paper. Its stench was very strong. It did precipitate  
 “ with several acids.

“ *February 2.* Sir ROBERT REDDING produced a fine shining sand, which  
 “ looked as if each grain had been gilded. He likewise gave an account of the  
 “ catching of lampreys in the barrow nigh Monaster-Evan. The sand was com-  
 “ mitted to Dr. MULLEN to try some experiments thereon.

“ A letter was read from Mr. MUSGRAVE, containing Mr. BENT's account how  
 “ they make turpentine, oil of turpentine, rosin, pitch, and tar, from the fir-  
 “ trees nigh Marfilles.

“ Mr. MOLYNEUX gave an account of some experiments he had made with the  
 “ pulvis fulminans in a pistol-barrel.

“ *Feb. 9.* The president being absent, my Lord Montjoy was pleased to take  
 “ the chair. His Lordship exposed to us the whole contrivance of the wind-gun  
 “ and all its parts.

“ A letter was read from Mr. MUSGRAVE, containing an account of Mr.  
 “ WALKER's experiments on land-carriages. Mr. MOLYNEUX thereupon moved,  
 “ that it may be tried, whether smaller wheels, if fitted with proportionable smaller  
 “ axle-trees, do not move as easily as greater.

“ A letter was read of Mr. ASTON, containing (with other particulars) an ac-  
 “ count of Dr. LISTER's experiments of freezing.

“ *Feb. 16.* Mr. SMITH being lately returned from the North, brought us an  
 “ answer to our queries concerning Lough Neagh. The answers were drawn up  
 “ by ARTHUR BROWNLOW, Esq; living in those parts, who has made it his busi-  
 “ ness to search into that matter these several years: these were very full and fa-  
 “ tisfactory: he concludes therein, that the water does not petrify, but that the  
 “ VOL. IV. C c c “ earth

"earth about the Lough does most certainly. The thanks of the Society were ordered to be returned Mr. BROWNLOW for this large and accurate account.

"Feb. 23. Dr. MULLEN presented a monstrous kitlin lately brought forth in this town. He gave an account at large of the anatomy thereof, with the sketches taken by Mr. SANDYS. In the *Journal des scavans pour Lundy* Juillet 15, an. 1680, there is just such another monstrous cat described, and the cuts thereof given. 'Tis very strange, that two errors of nature (for so we may call monsters) should thus exactly agree."

Upon the mention in these minutes of a *supellex philosophica* of forty instruments, proposed by Sir WILLIAM PETTY, as necessary for the carrying on the work of the Society, the secretary was ordered to desire a copy of it.

There being likewise mentioned an improvement of the digester, it was desired to know of what kind it was.

Concerning the periodical bleeding of the man at Trim, it was desired to know what remedies had been used, as caustics, ligatures, or stanching liquors, &c.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, March 6, 1684<sup>1</sup>, was read, mentioning among other things the balsamic earth, which by the description seemed to be petroleum.

A letter of Mons. JUSTEL was read, mentioning two new satellites of Saturn, discovered by CASSINI with 100 feet glass without a tube, and making five satellites; an hypothesis printing by CASSINI; and of a light seen after sun-set.

Mr. HOOKE remarked, that the same thing had been mentioned by Mr. CHILDREY in his *Britannia Baconiaca*; and that it often appeared about the beginning of February.

As to the instrument for finding the way of a vessel, he could not see, that it differed from Sir CHRISTOPHER WREN's, unless he had a description of it more particular.

A paper of Dr. SLARE was read, concerning an uncommon concrete found in the distillations of several vegetables. It was as follows<sup>2</sup>:

"In our common methods of distillation, we often resolve our vegetables into volatile salts, oils, water, fixt salts, and sometimes spirits; not that every vegetable does always afford all these, nor do even these (by some called principles of vegetable bodies) seem to exist so simple and pure, as not to be compounded, if not decomposed, and subject to yet various alterations. This has been sufficiently demonstrated at this board. In some late distillations I have found

<sup>1</sup> Letter-book, vol. x. p. 45.

<sup>2</sup> Register, vol. vi. p. 216.

" an uncommon concrete, that several vegetables have afforded me, so that now  
 " it shall pass no longer for a contingent experiment. This product, as to its  
 " substance, seems to be a salt shot into crystal, as chemists usually term their  
 " transparent and figured salts: in its figure is somewhat irregular. As to its  
 " weight, it does not near reach the gravity of any volatile salt I have met with.  
 " It just sinks in water, so leisurely, that it comes near it in specific gravity. It  
 " differs from most salts, and in this, from all vegetable ones, that it will not  
 " dissolve in water, but very easily in good spirit of wine. By its smell as well  
 " as the forementioned levity, it seems to be a true oil shot into crystals. The che-  
 " mists have in their writings set a high value upon such a preparation of an  
 " essential oil, for the production of which they allow many months circulation;  
 " but this is done with more ease. Finding it very differing from most of our ob-  
 " served products in spagyric analyses, I thought it fitting to present it to the  
 " Society."

Dr. LISTER observed, that camphire might be such a kind of production, which is an oil of the cinnamon-tree.

Dr. SLOANE said, that an oil was hardly to be got out of the cinnamon here in England; for that out of twelve pound of cinnamon there came so little oil, that it scarce made a liquor milky or white.

Dr. PAPIN made a trial, whether a pipe might be made to sound *in vacuo*, by putting a whistle into the hole of the pneumatic engine, so that the air getting in or out of the receiver must pass through the whistle. The event was, that when the receiver had a quantity of air in it, the whistle sounded; when it was void, it would not sound at all. His account of it was as follows:

" I have prepared another experiment, attempted first, but in vain, by the Flo-  
 " rentine academy, and afterwards successfully prosecuted by the hon. Mr.  
 " BOYLE, which had a very ingenious *apparatus*, to blow into an organ-pipe *in*  
 " *vacuo*, for to prove, that the air is necessary for sounds: but the disposition of  
 " my engine affording a very great conveniency for such an experiment, so that  
 " it may be repeated as often, and in what degree of rarefaction you please; I  
 " hope the Royal Society may, upon several circumstances, make some new ob-  
 " servations. My way is but to set the aperture of a whistle in the hole of the  
 " pneumatic engine, so that the air going out, or getting in to the receiver,  
 " must needs pass through the whistle: for having drawn some air from the re-  
 " ceiver into the pump, I must but keep open the communication between both,  
 " and letting the plug be driven up, the air returning into the receiver will blow  
 " into the whistle, and make it sound as well as a pair of bellows would do.  
 " But when the receiver is quite exhausted of air, no sound can be produced,  
 " though I let the plug be driven up very fast."

Mr. JOHN BEAUMONT presented a draught of his design for writing an history of nature and arts of the county of Somerset, which was well approved of by that

<sup>a</sup> Register, vol. vi. p. 212.

C c c 2

Society,

Society, who declared, that they thought him a fit person for the undertaking, and would be ready to give him any assistance.

March 18. Dr. LISTER vice-president in the chair.

Upon mentioning the extracts of cinnamon, Mr. LODWICK remarked from BALDEN, that the Indians make an oil out of the fruit of the cinnamon-tree, being like a small olive, having the smell and taste of cinnamon.

It was queried, whether this might not be the oil of cinnamon, which is brought into Europe.

A letter of Mr. RAY to Dr. ROBINSON, dated at Black Notley in Essex<sup>o</sup>, was read, wherein he doubted, whether our English maples would yield a saccharine juice ;

1. Because probably the Indian maple is specifically distinct from ours :
2. Though it be the same, it may yield a saccharine juice in America, though not in England.
3. The common maple bleeding little, and but at some times, it would be hard to have a quantity of the juice in the place, where he then was.

As to the history of fishes, he said, that it was as perfect as that of birds, excepting the cetaceous kind, which he desired might be supplied. With respect to the designs for the cuts, he said, that he had several drawn from the life, and had made references to the places in authors, where the best figures were extant.

The *exanguia aquatica*, he said, were omitted as insects.

Dr. ROBINSON was desired to return thanks to Mr. RAY, and request him to send up his draughts and the references to the figures, which he judged to be the best extant.

It being said, that there were some plates of figures of fishes and birds made by the Bishop of Chester<sup>o</sup>, which were in Mr. HUNT's hands, Mr. HUNT was ordered to get the plates of the fishes rolled off against the next meeting, in order that the Society might judge, whether they would be useful to this book.

Mr. RAY having scrupled the account of the unicorn-fish in the *History of the Antilles*, it was affirmed, that the book was of small authority, as being written in Europe ; and that particularly the account in it of the unicorn-fish was false.

Mr. HOOKE said, that there were several sacchariferous trees mentioned by PISO and some other writers.

<sup>o</sup> Letter-book, vol. x. p. 46. It is printed in Mr. RAY's *Poëtof. Letters*, p. 177.

† Dr. WILKINS.

The palm being mentioned, Dr. LISTER said, that it might be reckoned among the canes.

Dr. SLARE presented a man's head brought from the East-Indies dried, but having all the skin and flesh sticking upon it.

A letter of Mr. MUSGRAVE was read, concerning Mr. COLE's fish tinging with colours, said to be a sort of periwinkle.

An account of the ill effects of the cold on the 23d of December, 1684; another of the good effects of the Bath in the palsy and barrenness by Dr. PIERCE of that city<sup>1</sup>: and a third concerning the specific weight of several bodies carefully examined by Mr. CASWELL and Mr. RICHARD WALLER<sup>2</sup>, were produced and read.

Dr. SLARE shewed a parcel of the crystals mentioned at the last meeting as produced in the distillation of origanum. Some of these were delivered to Mr. HUNT to be kept in the repository, he being ordered first to design their figures.

They just sunk in water, being put upon a coal; they appeared to be all volatile: and some were put into water till the next meeting, to see, whether they would dissolve.

Dr. SLOANE presented some crystals of borax.

Dr. PAPIN shewed some juice of liquorice prepared with gum tragacanth and some with the gelly of bones.

He likewise shewed how sounds would be made in factitious air.

His account of both which was as follows<sup>3</sup>:

" Being commanded to try, whether factitious air would be fit for the production of sounds, I have prepared the engine, so that after the air is quite exhausted, and the whistle in the receiver can produce no more sound, I may cause some iron to fall into some *aqua fortis in vacuo*, from whence there will be some new air produced in the receiver; and it will be easy afterwards to try, by playing the pump, whether that new generated air, passing through the whistle, will produce any sound.

" I have also brought some of the juice of liquorice prepared with gum tragacanth, being now dry enough to be carried about: and I have at the same time brought some of the same juice prepared with gelly, that they may be compared together."

<sup>1</sup> It is printed in the *Philos. Transact.* N°. 163. p. 244. for March, 1685.

<sup>2</sup> Ibid. p. 227. It is in the letter-book, vol.

x. p. 60.

<sup>3</sup> Register, vol. vi. p. 211.

Upon passing of air through the whistle, the sound was very clear and loud.

He was ordered to try against the next meeting to make a jelly of the Jesuits bark.

1685, *March 25*, Dr LISTER vice-president in the chair.

Dr. SLOANE presented a piece of the bark of the root of the cinnamon-tree; some of the oil drawn from the bark of the root; and a piece of the camphire.

He remarked, that the way of extracting the oil and camphire was by putting the bark of the root in a copper vesica: and that the oil in the receiver, as soon as it cools, lets fall a camphire to the bottom: that the camphire of Japan was out of the leaves of a tree.

The oil, when it is first rubbed on the hands, has a strong camphire smell; but this afterwards in a minute or two changes into a cinnamon smell.

A letter of Dr. PLOT to Mr. ASTON, dated at Oxford, March 18, 1684<sup>1</sup>, was read, concerning Mr. WILLUGHBY's and Mr. RAY's *History of Fishes*, and mentioning, that Mr. ASTON's last letter had much lessened the opinion concerning that history; for it had been presumed before, that Mr. WILLUGHBY had taken all the draughts from the life, whereas it was now found, that the cuts must be picked up here and there out of books; which Dr. PLOT likewise found by Mr. ASTON's intimation to have been done in the *History of Birds*, by comparing several birds, which he, Dr. PLOT, had drawn from the life in Staffordshire with Mr. WILLUGHBY's, which he had found so unlike, that he thought now to have some of them engraven anew. He remarked also, that the Bishop of Oxford could not resolve or determine any thing about printing the book there, till he had seen what it was; and that therefore those draughts, which were ready, should be sent thither; and that his lordship thought, that but one hand should be employed in the engraving the plates.

The Society considering the uncertainty of the offer, and the length of time, that one hand would require to engrave all the plates, resolved to undertake the printing the book at their own charge, and appointed a committee for that purpose, consisting of the president, Dr. LISTER, Dr. ROBINSON, Mr. WALLER, Dr. TYSON, Mr. RAY, Mr. HILL, and Mr. ASTON, or any three of them.

Mr. ASTON was accordingly ordered to send notice thereof to Oxford, and to desire, that the bishop would print the book for them, the Society being at the expence of the impression, and sending down the paper, if necessary.

A letter of Mr. JUSTEL to Mr. ASTON dated, March 20, 1684<sup>2</sup>, was read,

<sup>1</sup> Letter-book, vol. x. p. 54.

<sup>2</sup> Ibid. p. 16. It is printed in the *Philos. Transact.* N°. 172. p. 1030.

concerning a sort of bees at Cayenne in America, observed by Monf. VILLER-MONT, very different from those here in Europe.

The same letter mentioned a white cinnamon at Guadaloupe, and another at Maragnan like that of Ceylon; and that ambergris is a sort of wax and honey fallen into the sea between the tropics.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, March 21, 168 $\frac{1}{2}$ , was read, concerning the comparative weight of several bodies, as follows:

" A Cubic foot of sand weighed	— — — — —	85	— 3
" Of New-castle coal	— — — — —	67	— 12
" Of Gravel	— — — — —	109	— 5
" Of wood-ashes	— — — — —	58	— 5

" It was affirmed, that a bushel of corn weighs more in dry than in wet weather: that 64 lb of meal makes 35 lb of fine flower, if it be from the best wheat, and very dry. Pump-water and that of Isis were found of equal weight, by weighing 5 lb 5 $\frac{3}{4}$  of each, with scales, that turn with a small bean about a quarter of an ounce in weight; so that a difference less than 1 in 400 could not hereby be distinguished."

This letter mentioned likewise, that there had been communicated to the Philosophical Society at Oxford a catalogue of some of the *desiderata* in chemistry, and Mr. BEAUMONT's draught of his design of a natural history of Somersetshire.

Part of a letter of Mr. LEEWENHOECK to the Society, dated at Delft, January 23, 168 $\frac{1}{2}$ , was read, concerning the figures of the salt of carduus benedictus, of the salt of wormwood, of alum, salt-petre, and vitriol of Cyprus.

Dr. LISTER remarked, that there were figures of common salt and alum among the salts of wormwood and some others; and that it was to be wished, that Mr. LEEWENHOECK had prepared all his salts himself. He queried, whether Mr. LEEWENHOECK had ever seen salt of nitre finished at both ends, and how many sides it had; and he desired, that Mr. LEEWENHOECK would describe a large crystal of alum and a large crystal of vitriol.

Mr. ASTON was desired to take instructions from Dr. LISTER, when he shall next write to Mr. LEEWENHOECK.

Dr. PAPIN reported, that he had put Jesuits bark and spirit of wine in the digesting engine, and given fire enough to soften bones, and that the tincture was high.

<sup>a</sup> Letter-book, vol. x. p. 61.

<sup>b</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 173. p. 1073. for July 1685.

He was ordered to put the bark again in the digester, and try to bring it to a mucilage; and to take two more quantities of bark, and put water to one, and wine to the other; and try what they will be by a long digestion.

He likewise made the experiment of the different operations of water and wine upon flesh and bones put at the same time in the digester. The success was, that in the water the flesh and bones were very soft; in the wine the meat and bones less soft.

April 1. Dr. LISTER vice-president in the chair.

A letter of Mr. THOMAS MOLYNEUX to Mr. ASTON, dated at Leyden, March 14, 1685\*, was read, as follows:

"I shall now be as good as my promise, and send you the names of those natural curiosities Dr. HERMAN preserves here in his balsam; which are not so considerable for their number, as that several of them have not hitherto been described by any writer, either of travels or natural history. Of these he designs to give the world an accurate account, in a book he will call *Museum Zeylonicum*, which he has long promised the public; and therefore I will set down little more than just their bare names, which are as follow:

- "1. *Lacerta Indica maxima*, crocodili terrestris species, Bontii Histor. vid. lib. 5. cap. 4.
- "2. *Vipera Indica conspicillo notata*, cobra das capellas Lusitanicè dicta.
- "3. *Vipera Indica tricolor*.
- "4. *Crocodilus*.
- "5. *Lacerta Zeylanica ex gryseo cinerea chamæliontis capite*.
- "6. *Loligo minor Indica*.
- "7. *Kahakurulla*, i. e. Indicè avis crocea.
- "8. *Sciurus Zeylanicus*.
- "9. *Felis Indica silvarica ursinam faciem gerens*.
- "10. *Simia Indica tardigrada ignota*.
- "11. *Lacerta Indica diversicolor dorso squammato et serrato*.
- "12. *Mustela vulgaris*.
- "13. *Mustela alba*.
- "14. *Ananas Acostæ; carduus Brasiliæ foliis aloes*. Bauhin. in Pina, 3 & 4.
- "15. *Bananas seu palma humilis longis latisque foliis* Bauhin. Pin. p. 507.
- "16. *Lacertus squamosus* Bont. l. 5. c. 8.
- "17. *Serpens Indic. ex albo et lurido maculatus*.
- "18. *Fœtus humanus masculus semestris*.
- "19. *Palakothaja, avis Zeylonica coloris ex spadiceo viridantis*.
- "20. *Priapus vegetabilis*.
- "21. *Cinamomi arboris ramulus cum fructibus*.
- "22. alter cum floribus.

\* Letter-book, vol. x. p. 49.

- " 23. Sandalmalam seu hyacinthus Indicus tuberosus.
- " 24. Sirii Bont. Hist. l. 6. c. 2.
- " 25. Lepores gemelli monstrosi sibi invicem conjuncti.
- " 26. Flores nucis faufel, Bont. Hist. l. 4. cap. 2.
- " 27. Hydrym Markgravii, l. 4. c. 22. falso concha anatifera dict.
- " 28. Aselli majoris partes genitales.
- " 29. Uterus conchæ Malabaricæ chiancos dictæ.
- " 30. Lacertus volans, Bont. lib. 5. cap. 7.
- " 31. Fructus intiger cacao dict.
- " 32. Halcyon Zeylonica.
- " 33. Piscis marinus maculis ex fusco gryseo notatus.
- " 34. Pisciculus Indicus fluviatilis.
- " 35. Scorpion niger Indicus.
- " 36. Pstacus nanus rostro coccineo.
- " 37. Piscis compressus marinus Zeylonicus siferino adfinis, spadiceus, albicantibus per transversum lineis notatus.
- " 38. Tullica; avicula Zeylonica mellivora lucida nigra, rostro longissimo acuto et adunco.
- " 39. Araneus maximus seu phalangium Americanum Nahamda Margrav.
- " l. 7. cap. 3.
- " 40. Passer Zeylonicus agrestis.
- " 41. Mus Indicus arboreus striatus.
- " 42. Sargasto tenuifolius; ex mari viride.
- " 43. Piscis compressus Zeylonicus marinus siferino adfinis fuscis cancellatim ex currentibus lineis notatus.
- " 44. Alter ejusdem generis lineis diversi coloribus notatus.
- " 45. Serpens Indicus viridis gracilis chatulla dict.
- " 46. Chanaeleo Africanus.
- " 47. Eruca maxima Zeylonica staya pedibus ac dorso pilosis.
- " 48. Arumalia Margrav. l. 7. c. 5. locuste species.
- " 49. Locusta Zeylonica tardigrada stibilis capite et pedibus alatis.
- " 50. Locusta Zeylonica viridis.
- " 51. Locusta Zeylonica tota foliacea, folii limonii decidui facie, ab incolis folium ambulans vocata, seu parandela.
- " 52. Locusta Zeylonica cucullata viridis.
- " 53. Amphispæna Zeylonica, cujus cauda et caput vix differunt inter se.
- " 54. Lumbricus Zeylonicus maximus cæruleus.
- " 55. Serpens Indicus viridis binis per longitudinem albicantibus lineis notatus.
- " 56. Onisus seu Millipes Pison. l. 5. c. 11.
- " 57. Lacertus Indicus lævis domesticus; Americana Brasil. Marggr. l. 6. c. 12.
- " 58. Coluber Zeylonicus foscilis ornatus.
- " 59. Coluber Zeylonicus ex fusco et albo maculatus.
- " 60. Coluber pictorius *ἰχθυόμορος*.
- " 61. Coluber Indicus bubalinus.
- " 62. Vipera Zeylonica.
- " 63. Coluber viridis obesus, multa pinguedine abundans.
- " 64. Coluber *φιδιόμορος* ex gryseo et fusco variegatus.

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" 65.

- " 65. *Lacerti squamosi Clusii embryo cum secundinis.*
- " 66. *Millipes Zeylonicus niger.*
- " 67. *Scincus.*
- " 68. *Concha margaritifera cum pisce & margarita.*
- " 62. *Simiæ tardigradæ Zeylonicæ abortus.*
- " 70. *Piper rotundum nigrum, planta integra.*
- " 71. *Avicula Zeylonica.*
- " 72. *Bombyx Zeylonicus.*
- " 73. *l'alakothaia minor et elegantior.*
- " 74. *Coluber Indicus viridis binis per longitudinum albicantibus lineis et nigricantibus notatus.*
- " 75. *Avicula Africana mellivora dulcedinem ex floribus leonuri, a Breynio descripti, colligens.*
- " 76. *Avicula Zeylonica nigra collo coccineo.*
- " 77. *Loxia Willughbei.*

" This is the collection which at present Dr. HERMAN has in possession, he daily adds to it, and tells me he suddenly expects from the East-Indies such a number of exotics, as will equal what he has already, so that at last it may become as well considerable for its variety, as for the rarity of those things it contains.

" Whether the collection of Dr. SWAMMERDAM be the same with that, of which you have seen a printed catalogue, I cannot say, but I believe 'tis not. 'Tis not possible for me to procure a catalogue of what it contains, so that all I can do in this particular, is to set down what I have seen, as far as my memory will help me: if this will be any way satisfactory to you, you may command me.

" The glasses Mr. LEEWENHOECK shewed me, magnified objects no more than several other glasses I have seen before, and therefore discover nothing but what may easily be seen by help of other microscopes: so an account of them would be no ways satisfactory; 'tis only his own private glasses, which make those more than ordinary discoveries. I never heard he sold those glasses of his more common sort; but I shall not return suddenly into England, for I design to stay some while in France, and perhaps visit Italy before that time: so I cannot serve you in this particular; but wherever it lies in my power, you may command, &c.

" They talk much here, at present, of the madman at Harlem, that as certainly fasted forty days and forty nights. Doubtless by this time you have heard of it. I design suddenly to go and see him."

On occasion of the story of the madman at Harlem, who fasted forty days, it was remarked, that this was no disease nor cheat: that a woman of Poictou and one in Derbyshire had lived a year without eating; but their guts were dried up.

On the occasion of cheats, Dr. LISTER said, that Mr. WILLUGHBY had detected

tested that of the woman, who pretended to take worms out of the teeth with a quill, having forced the quill from her just as she was putting it into his mouth, and found small worms in it.

Dr. TYSON said, that he had a tooth drawn at Oxford several years ago, which being put presently into the place, where it had grown, stuck after four days so fast, that he could eat with it; and that he had the same tooth now.

It was conceived by Mr. HENSHAW, that teeth drawn will not fasten again in old people.

Dr. LISTER observed on occasion of the catalogue of Dr. HERMAN's curiosities, that in hot countries the serpent kind are numerous; whereas in England they are but three or four; as the common snake, the viper, and the slow-worm.

Dr. SLARE remarked, that a slow-worm had been vomited out of a man's stomach, and that one Mr. PLUMPTRE had kept it in a glass some months with an intention to send it to the Society; but that at last it got away from him. Dr. SLARE was desired to procure a particular account of the matter of fact.

Upon the mention of a *concha margaritifera cum margarita*, Mr. HENSHAW remarked, that the pearl consisted of a multiplicity of coats like a bezoar; and that it might be bred in the stomach.

Dr. LISTER said, that he had found sixteen pearls in the muscle, that adhered to the shell, and none in the body of the fish.

A letter of Mr. MUSGRAVE to Mr. ASTON\*, was read, concerning some old painted glass brought from Woburn abbey in Bedfordshire; the cœcum of a man dead of a consumption, being very small; Mr. DALGARNO's proposal to deliver up his papers about the universal character to any worthy undertaker; a woman cured of deafness by a fall from a horse, and a blind person, who was restored to sight by bleeding at a wound; a cure by Dr. TURBERVILLE of a person, who could see in the night, and not in the day; and an account of one, who could not see, if he suffered the hair of his head to grow above an inch long.

It was conceived, that the ancient glass-painting was but rude, as being pieces of glass coloured quite through, or bubbles dipt in coloured glass, and then blown, the colour being but on one side, which is often scratched away till you come to the white, where another colour may be laid on, or the white left for heightening,

As to seeing in the night, Dr. LISTER said, that King CHARLES I. had a man from Louth in Lincolnshire, who served as a guide to the army in the night; and that he could read a letter in the darkest night

With regard to the cœcum, he observed, that it was often very small in a man.

\* Letter-book, vol. x. p. 64.

A paper was read containing some propofals and confiderations about the printing of the *History of Fishes*.

A letter of Mr. RAY to Dr. ROBINSON was read, returning his thanks to the Society for their intentions to print his book and some other things relating thereto.

A paper of Mr. CASWELL was read, concerning the manner of taking the specific gravity of feveral bodies; as that the folids were examined hydroftatically by weighing them in air and water; but the fluids by weighing an equal portion of each in a glafs holding about a quart.

Dr. PAPIN brought in the experiment of the Jefuits bark boiled fix hours together in the digefter in three feveral menftruums. The fire ufed was fuch as evaporated a drop of water in three feconds.

It appeared, that the bark boiled in water was infipid and foft; the water like-wife infipid.

The bark in white wine was not fo foft, and the infufion was ftronger.

The bark in fpirit of wine was much harder, and ftronger tafted.

He likewife brought in a fpecimen of another ufe of the digefter, viz. the making of medals with the gelly of bones, which fhall receive the exa<st impreflion, and be fo hard, that they cannot be fcratched with the nail, nor be broken by falling down.

The members prefent were very well fatisfied with this experiment, and ordered Dr. PAPIN to take off fome good impreflions, which might be laid up in the repository.

*April. 8.* Dr. LISTER vice-president in the chair.

The Earl of Pembroke was prefent.

Dr. PIR, who had been formerly chofen, and had time allowed him for his admiffion on account of his refidence at Oxford, was now admitted.

Upon a difcourfe concerning the ufe of the cœcum, Dr. PIR faid, that it was full of glands.

Dr. PAPIN brought in feveral pieces of plaifter of Paris, and fome pieces of the fame fize being plaifter, out of which the air had been exhausted, and the cavities filled up with gelly of bones, to try whether they would become more tough. A fcale being hung upon the plaifter of Paris, it broke with 4½ pounds. The fame fcale being hung upon the plaifter of Paris boiled in gelly, it broke after half a minute with 6 pounds.

\* *Philof. Tranf. N°. 169. p. 928.*

A pear shut up *in vacuo* last year was viewed. It looked well, but some moisture was got out, and lay in the glass, which was not opened.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, April 2, 1685<sup>b</sup>, was read, mentioning, that Dr. PEIRCE of Bath said, that the substance found by him in the ureter of a man was a shell, and not a stone shaped like a shell; and that two evels or newts were found alive in a stone two feet thick and two feet and an half under ground, as could be well attested.

It was queried, why Dr. PEIRCE took the substance to be a shell.

With respect to the evels found alive in a stone, several things of a like nature were mentioned, as a toad found in a stone, as also in a tree in Berkshire; a bird unperished found in the middle of a tree; an olive stone in the middle of a tree.

A paper was communicated from the Philosophical Society at Oxford, occasioned by a discourse read there, March 24, 1684, concerning the advantage, which those men, who want sight, may have as to memory, and the application thereof. It contained an arithmetical operation performed by Dr. WALLIS in the night without light, or pen and ink, being the square root of 3 with 40 cyphers adjoined, and at another time the square root of a number of 53 places<sup>c</sup>.

A discourse was read, which had been presented to the Dublin Society by Mr. ST. GEORGE ASHE, fellow of Trinity-college there, and of that Society, stating of what use in mathematics the solution of the problems of squaring the circle, doubling the cube, trisection of an angle, inscribing geometrically a regular heptagon in a circle, &c. would be; and what advantages may be reasonably expected from such discoveries. For instance, whether in the business of squaring the circle, the compendiums of sines and tangents logarithmically used, and the infinite approximations already known, do not answer all useful ends, as fully and well: together with a demonstration *quod cognito centro gravitatis lunula babetur circuli quadratura*<sup>d</sup>.

A printed paper of Mr. MERCATOR was communicated by Mr. HENSHAW, containing five propositions concerning the quadrature of the circle, which he professes himself ready to demonstrate.

A letter of Mr. RAY to Dr. ROBINSON, dated at Black Notley, April 1, 1685<sup>e</sup>, was read, concerning the lampetra and fincacle of Dr. PLOT, said to be fishes undescribed, and the making of sugar out of the juice of maple. It was as follows:

"I wrote to you by the last post, and yet I cannot let you rest. Searching Dr. PLOT's history, and considering his descriptions of the fishes named, I be-

<sup>b</sup> Letter-book, vol. x. p. 66.

<sup>d</sup> Letter-book, vol. x. p. 70.

<sup>c</sup> Ibid. p. 67. and *Philos. Transact.* N<sup>o</sup>. 178. p. 1269. for December 1685.

<sup>e</sup> Ibid. p. 62.

gin to be in doubt, whether they be already described or no. The first is a sort of lampetra, with roded or straked sides, which whether described and entered in our history I cannot certainly say; you may easily by comparing the description of those we have entered (which are not many) resolve that. There are also in BALTNER some fishes of that kind figured and described, which we have not admitted. The lampetra flava I take to be an accidental variety, and the lampetra bicauda a monstrous production, not a constant species; but there are one or two more, which possibly may be new species. Not understanding high Dutch, I was at a loss, and uncertain concerning some species there figured. For though it is not to be supposed, that a man of his education should be able to describe animals well, yet so much might be gathered from the notes he gives, as might lead an understanding and attentive man into the knowledge of them, and with the figures (which are in all very exact) give him so much light as to enable him to determine the species. There is next to these an anguilliform fish, I am in doubt of.

“As for the finscale of Dr. PLOT, if it hath indeed, as he saith, teeth in the mouth or lips, it is a strange and unheard of fish, doubtless not yet described nor mentioned by any author. But I suspect the doctor was therein mistaken, and that it is a leather-mouthed fish, and carries its teeth as the roach, and all other of that tribe doth, in the bottom of its mouth, or in its throat, or in the mouth of its stomach, which you please. I remember the draught of a fish in BALTNER, which, as I take it, he calls rotele, which for all the name is not the rutilus or roch. I knew not what to make of it, nor could I find it in other books, and therefore put no name to it, nor yet entered it in the history. Dr. PLOT's description answers so well to this figure, that I am persuaded the finscale and rotele of BALTNER are the same fish (if I remember aright, and that broad fish with the very red fins in BALTNER be termed rotele) and that it is a new, and by us unseen and undescribed kind. But you, that have the picture and the descriptions, both of BALTNER and Dr. PLOT to compare with it, will be able to make a better judgment. I have neither description of fishes, nor any book to help me but one, that, as I told you, is worse than none, more apt to confound than resolve. I believe it is not the ballerus of RONDELETIUS. A friend and neighbour apothecary, whom I employed, yesterday, brought me the effect of his boiling the juice of the greater maple. Having boiled as high as an extract, he found a whitish body somewhat like brown sugar, and tasting sweet, but withal of a woody relish; immersed in a body of the colour, and consistency, and taste too of molosses. Upon curing I do not doubt we shall have after the molosses is separated, a perfect sugar; but in very small quantity, not above an ounce from a gallon of liquor. Possibly, nay likely, afterwards, when the liquor begins to run thick near its ceasing, it will yield a greater proportion of sugar. When he hath cured it, I will give you a farther account of it, &c.”

Dr PAPIN repeated a former experiment. Let an exhausted bolt-head stand with the neck in water *in vacuo*. If the air be admitted into the receiver, the wa-

ter

ter rising violently into an oval bolt-head turns round into a cylinder for some time before it settles : but the same did not happen in a round bolt-head.

Upon a trial now with a round bolt-head, the water twined as in an oval one.

*April 15.* A proposal of Dr. LISTER was read, of a new way of cutting for the stone in the bladder, by opening the fund of the bladder, and taking out the stone from above by a cut in the abdomen of men, as follows :

" I was long since put in mind of this way, by an observation I chanced to make in the dissecting of a bitch, which had been formerly spayed, and the womb cut out : but (I know not how the bunglers had ordered the matter) I found part of the fund of the bladder grown within the lips of the wound, and the fund itself a little more fleshy than usual. I could not find the bitch otherwise was ill, though I had not had her long in keeping.

" I am, I say, from this observation forward to believe, that the fund of the bladder may be opened, and the stone taken forth from above by a cut in the abdomen of men.

" And from this way of cutting, these advantages seem to follow ; that, provided it heal (which this observation shews it will,) a bare incision of parts without bruise or other violence, save a few stitches at the close of the operation, is all that need to be done ; that the stone may be much more readily come at, for that the fund of the bladder is large, and may this way be handled before the extracting the stone, so as to be certain of what is farther to be done, to proportion the wound to the stone contained in it. Again, by this way a very great stone may be most readily broken to pieces by the forceps. Also this way those bruises are avoided, which necessarily happen from the frequent and violent succussion of the forceps to catch in them the stone or stones ; and sometimes the fatal mistakes of taking hold of some folds of the flaccid and empty bladder together with the stone, which, perhaps, is too often done, and then 'tis excused by the growing of the stone to the sides of the bladder.

" I therefore recommend the experiment to be tried expressly on a dog, that it may be more circumstantially noted, what the success will be in the healing up the pieced bladder, stitched within the lips of a wound in the abdomen, made over against it."

It was recommended to be tried on a dog, that it may be circumstantially noted what the success will be in the healing up of the pieced bladder stitched within the lips of a wound in the abdomen made over against it.

For this experiment were nominated Dr. PIT, Dr. TYSON, Dr. AGLIONBY, and such other of the physicians, as could attend it.

A letter of Dr. SOLOMON REISELIUS to Mr. ASTON, dated at Stutgard, March 6, 1684, in answer to Mr. ASTON's to him of December 17, 1684, was read, mentioning his having received the tables of the eclipses of the satellites of Jupiter, and desiring the *Philosophical Transactions* to be sent to the Duke of Wurtemberg, and a correspondence with Mr. WILLIAM SCHROTER and with the Society.

\* Monsr. JUSTEL related, that Monsr. VILLERMONT had found out a way of perpetuating the use of pot-ashes in soap for the washing of linen by filtrating the salt of the lye employed, and making use of it again with new oil for the making soap: and that the same salt had been used thirty times successively:

That the same Monsr. DE VILLERMONT had a method of reducing molosses into fine sugar by making it granulate: and

That Monsr. CASSINI's two satellites of Saturn new discovered were the nearest to his body, but their motion was not yet determined.

He mentioned, that Monsr. DE VILLERMONT desired to be of the Society, which was referred to the council.

Dr. PAPIN shewed several patterns of medals made with gelly of bones, that it might be judged, which appeared the best.

He likewise shewed a mixture of plaister of Paris and gelly of bones, which was difficultly dried, and then was apt to be chopped, and consequently would be unuseful.

The transcript of a part of a letter of Mr. COLE to Mr. RAY was read, mentioning his having found several sorts of figured stones this winter, which he judged never were either animals or vegetables, or any parts of them:

As also concerning his sort of purpura or colour-fish, whose staining after passing through a great many colours successively fixes into a scarlet purple, which is no more to be altered by washing.

He promised to communicate to the Society the shells of the fish and his observations.

Mr. HOUGHTON shewed a root of a kecks, whose fibres were prettily twisted and interwoven, as that sort naturally are.

April 22, at a meeting of the COUNCIL were present,

The Earl of Berkley	Dr. LISTER vice-president
Mr. COLWALL	Mr. WALLER
Mr. HILL	Mr. HALLEY
Dr. SLARE	Mr. HOOKE
	Mr. ASTON.

\* Letter-book, vol. x. p. 92.

Mr.

Mr. J. BEAUMONT, Mr. CHARLES LEIGH, and Mons. DE VILLERMONT were agreed to be proposed to the Society as candidates.

It was ordered, that a quarter of a year's salary be paid to Dr. PAPIN :

That Mr. FOSTER's bill for cataloguing the books in the library be paid after the rate of 4 s. *per diem* :

That the treasurer pay for the plates and drawings of the *History of Fyfes* :

But that if a member of the Society pay the price of a plate and the engraving, then his name shall be set down on the plate, with notice, that he was at the charge of it.

Dr. SLARE proposed a person for a chemical operator to the Society, who should attend at their meetings, and be contented with a moderate salary : which motion was approved.

Mr. HOOKE proposed, that a book sent to him from Cambridge might be encouraged in the printing.

This book was referred to Sir CHRISTOPHER WREN and Mr. HALLEY to be read over, whose report should govern the resolution of the council upon that affair.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Dr. GARDEN's attempt of an acrostical hypothesis of the various changes of the weather, sent from Aberdeen to the Philosophical Society at Oxford, and by them communicated<sup>a</sup>, was read.

It supposes, that when the atmosphere is heaviest, the vapours, as lighter fluids, arise and swim at the top of it ; but when the atmosphere is light, the vapours fall down again. This is asserted to agree with observation.

It supposes likewise, that when the pressure of the air is lessened in one place (as at Edinburgh) the neighbouring parts of the atmosphere, whose weight is not lessened, run there in a current till all be reduced to an æquilibrium, and thence come winds. This is also asserted to agree with observation ; for upon wind the quicksilver falls, or is in motion.

As to the different changes of the specific gravity of the atmosphere, it is supposed necessary to know the cause of gravity in general, and of the air's weight in particular, for which it is hinted,

1. What may be the nature and properties of the æther ; and what influence it may have on the changes of the air's gravity.

2. Whether nitrous steams, or some such mixture, may not alter the air's specific gravity.

<sup>a</sup> Letter book, vol. x. p. 74. It is printed in the *Philos. Trans.* N<sup>o</sup>. 171. p. 931, for May 1685.

3. What influence the change of the air's spring by heat or cold may have upon the change of its weight.

Dr. WALLIS said, that to make the vapours ascend, there must be an impetus, as when dust rises in a room :

That the vapours are raised out of the earth by some such cause as heat or fermentation, and are carried up as long as that impetus is able to surmount the weight of the air ; but that then they fall again.

As to the rising of the quicksilver in the barometer in hot weather, he queried, whether it might not swell by reason of some latent air in the body of the quicksilver, for that he formerly observed the first three years his barometer was filled, that upon great heat it used to rise ; but afterwards upon the like occasion it fell ; and he supposed, that the air then was got out of the quicksilver, and remained in the empty space of the glass.

An experiment was ordered to be made in hot weather with a tube and quicksilver well exhausted and filled by Dr. PAPIN, after his way.

Dr. PAPIN made an experiment to shew how high the water would probably rise in an æquicrural syphon, as it was proposed by Dr. REISELIUS.

A pipe full of water had its aperture inverted in a glass containing some water. When the air was half exhausted (as appeared by a quicksilver-gage) the air-bubbles appeared plentifully in the pipe. Whence he concluded, that a syphon of sixteen feet high would at the top produce bubbles, which in as slow a motion, as that of this syphon, would hinder the running of the water.

He would not advise to trust to this syphon for above ten or twelve feet of water.

Dr. PAPIN likewise tried, what degrees of exhaustion in the pneumatic engine would be necessary to make tepid water boil. The water did not begin to boil till the air was near all exhausted.

*April 29. Dr. LISTER vice-president in the chair.*

There were proposed as candidates,  
Mons. DE VILLERMONT by Mons. JUSTEL,  
Mr. CHARLES LEIGH by Mr. MUSGRAVE,  
Mr. JOHN BEAUMONT.

There was presented by Mr. BOYLE his book intitled *Short Memoirs for the natural experimental History of mineral waters*, addressed by way of letter to a friend.

Mons. BERNIER being present at this meeting gave to the library his epitome of GASSENDUS's Philosophy in six tomes.

A letter

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, April 27, 1685<sup>1</sup>, was read, mentioning an extraordinary tide at Dover on the 19th of March, when after it had flowed some time, it ebbed two feet, then flowed again, then ebbed and flowed a third time, and so a fourth, so that there were four flowings and three ebblings in one tide.

This letter mentioned likewise, that in the *Iter Germanicum* of father MABILLON, printed at Paris in 1685, there is the delineation of a telescope, as it was described by CONRADUS VICTOR, who lived before the year 1241: which tube differs from the *dioptra Ptolemaica* found in the manuscripts of the great SYNTAXIS and of the *hypotyposis* of PROCLUS: and

Mr. COLE in a letter observed, that there is a substance, proceeding from calamine ore, which far exceeds in colour and fineness all metals besides gold and silver; and that if this substance were made malleable (as he imagined it might) it would, he thought, bring brass and copper into contempt.

As to lapis calaminaris, Dr. LISTER observed, that it is a lead ore; that it calcines as lead does, and turns, like it, into several colours:

That he did not doubt, that several things would electrify.

There was read a discourse of Dr. WALLIS concerning the air's gravity observed in the baroscope<sup>2</sup>, occasioned by Dr. GARDEN's *aerostatical hypothesis*, read at the last meeting.

Part of a letter of Mr. LEEWENHOECK of January 23, 1684, was read, concerning the figures of oil of tartar *per deliquium*, of Muscovy pot-ashes, and of camphire<sup>3</sup>.

Dr. PAPIN made an experiment, to shew how water passing through a piece of dried oak was full of bubbles; but water passing through a piece of leather, had no bubbles at all. His account of it was as follows<sup>4</sup>:

" There having been a question moved in the last meeting, whether water  
" might turn into air, I have made an experiment, that will, perhaps, give some  
" light therein, and into the nature of plants. I take a receiver, that hath a small  
" hole at the top; and having stoppt the said hole with cement and a piece of  
" wood, that passing through the hole remains half within, and half without the  
" receiver, I put the great aperture of the said receiver upon the plate of the  
" pneumatic engine, and keeping the wood, that is at the top, quite under water,  
" I draw the air out of the receiver. Then I see, that the water, which is at the top  
" of the wood, being driven thorough the wood into the exhausted receiver, will  
" produce there a great many bubbles: and such bubbles will appear even if the  
" said water hath been first well purged of air: so that it seems the wood hath  
" some property to turn particles of water into particles of air: which will seem  
" the more probable, if you make the same experiment with a piece of leather

<sup>1</sup> Letter-book, vol. x. p. 121.

<sup>2</sup> Ibid. p. 106. It is printed in the *Philos. Transact.* N°. 171. p. 1002.

<sup>3</sup> Ibid. N°. 172. p. 1077—1080.

<sup>4</sup> Register, vol. vi. p. 238.

"instead of wood, because the water being after the same manner driven into the exhausted receiver thorough the leather will never produce any bubble."

It was queried by Mr. WALLER, how long the water passing through wood will appear full of bubbles? Whether the bubbles will not be spent in a day's time?

Dr. PAPIN was ordered to provide an æquicrural syphon made of tin, about twelve or more feet long, to examine how high water may be made to ascend in it.

May 6. Dr. WALLIS presented to the Society a printed copy of his *History of Algebra*, wherein the faults of the press were many of them corrected with his own hand.

A man belonging to Mrs. PLAYFORD the printer having delivered a message, that there would be sixty copies of the Algebra brought to the Society, if they would pay 60*l*.; it was answered, that if he brought to many copies, the Society would endeavour to sell them within a month or two, and deliver him the money, or part of it, and the remainder of the books, provided the books were brought before the members of the Society could buy them in another place. But the man having no power to deliver the books, Dr. WALLIS undertook to furnish twelve books for the present.

Upon mentioning the mixture of lapis calaminaris with copper, Sir JOHN HOSKINS said, that he had been informed, that there was a way of increasing iron, but that it would not be tough, being serviceable only for cast iron.

Dr. WALLIS proposed, as from the president, that some person might be employed to search the registers for what relates to navigation.

It was answered, that the books were ready for any member of the Society, who would undertake the search; but that navigation had not been the general work of the Society, but the task of some particulars, as Lord Viscount Brouncker, and some others, whose inventions were many of them never brought to be registered. Nevertheless, that there are many things in the books relating to magnetism, the variation of the compass, &c. and that the Society should be ready to receive commands of the president.

Dr. SLOANE presented three sorts of a sweet smelling earth, found at Hoxton in a field, where some workmen were digging cellars for houses, that were building. In digging but six feet deep there was first cast up a clay, then a gravel, and afterwards a sand, all smelling, but the lowermost the strongest. It seemed to partake of a petroleum: and he said, that it had yielded an oil upon distilling.

Mr. HENSHAW related, that he had been told, that in the French King's gardens at Paris, the top of the skull of a pigeon had been pared off, and the brain cut out, at some distance from the optic nerve: and that the vacuity having been filled with white wax, the pigeon had been seen to pick up corn three hours afterwards, but died in six hours.

Dr.

Dr. SLOANE said, that all the cerebrum of a dog (and not the cerebellum) had been cut out at Montpellier by Monsr. CHIRAC, and the cranium filled with earth: that the dog had lived twenty four hours; but another dog, upon cutting the cerebellum, presently died.

There was read the latter part of Mr. LEEWENHOECK's letter of January 23, 168 $\frac{1}{2}$ , being observations of the figures of the salts contained in the ashes sticking near the mouth of an oven of a foundry of cannon; in the ashes sticking to the sides of an oven, where lead is calcined; in the salts of quick lime; in the lime of sea-shells; in the English soda or glass-wort; in the soda of Britany; in the soda bariglia of Alicant: and in sal armoniac\*. The figures were likewise shewn, curiously designed by Mr. LEEWENHOECK.

In the postscript he mentioned, that he had found in the womb of a bitch, that had been limed three or four times not three days before, a great number of living animals, which are the seed of a dog.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, May 1, 1685<sup>o</sup>, was read, mentioning, that at Leyden there had been cut out of a bladder by SMAERIUS a few years ago two inches of the small end of a tobacco-pipe, which had been stuck into it some time before, and was kept at Leyden; a farther account of which might be procured from Mr. THOMAS MOLYNEUX: and

That one COLEBRON, a chirurgion in Suffex, had twice cut out the stone of the bladder after the manner mentioned by Dr. LISTER; and that in one of these attempts, the patient being a young child, he had succeeded.

This letter was accompanied with a copy of Sir WILLIAM PETTY's *suppletia philosophica*, as it had been offered to the Society at Dublin, containing forty five articles, as follows:

- " 1. Scales and steelyards to weigh in the air and water.
- " 2. Scales to shew the weight without prosthaphæresis.
- " 3. Instruments whereby to measure the superficies of irregular bodies.
- " 4. Instruments to measure irregular magnitudes.
- " 5. To measure the fineness of gold and silver.
- " 6. To measure the loading and unloading of a ship.
- " 7. To measure the goodness of telescopes and microscopes.
- " 8. To measure the heat, moisture, and weight of the air.
- " 9. To measure sun-shine and rain, and the force of wind.
- " 10. To measure the strength of saline liquors.
- " 11. To measure the strength of brandy and other spirits often distilled.
- " 12. A parallelogram.
- " 13. An artificial eye.
- " 14. A Monochord and pipe.
- " 15. A water level.

\* *Philos. Transa.* 9. N<sup>o</sup>. 173. p. 1081—1090.

\* Letter-book, vol. x. p. 138.

- " 16. A Mariner's compass, a variation, and dipping needle.
- " 17. Mr. FLAMSTEAD's quadrant.
- " 18. A clock.
- " 19. A spherical magnet, and other magnets with dust of the same.
- " 20. An exhausting engine.
- " 21. An Æolipile.
- " 22. A digester.
- " 23. A limbec.
- " 24. A randon bow.
- " 25. A gun-powder measure.
- " 26. A condensing pipe or wind-gun.
- " 27. A speaking trumpet.
- " 28. An acoustic-tube.
- " 29. Lamps.
- " 30. A measure of refraction.
- " 31. A wind-watch.
- " 32. Telescopes.
- " 33. Microscopes.
- " 34. Burning-glasses.
- " 35. Prisms.
- " 36. A stone-cutter's wheel and quadrants.
- " 37. A turner's lathe for compounded figures.
- " 38. A wind-furnace, bellows, and blast-pipe.
- " 39. A skrew-press.
- " 40. A touch-stone.
- " 41. A water-trough with pulleys and plummetts.
- " 42. A pair of globes.
- " 43. A fixed globe.
- " 44. A burning metal.
- " 45. A looking-glass.

Dr. PAPIN presented four medals made after his manner by order of the Society; the substance of them being only the gelly of bones, though the colours were different according to the foils.

He made likewise the experiment, how water would pass through leather and several woods; and whether it would produce bubbles. His account of it was as follows:

" Being commanded to try, whether water might be driven into an exhausted receiver through the grain of leather, and several sorts of wood; and whether it would produce there any bubble, I have made four experiments upon that subject, and having first tried a piece of leather much after the same manner as in the last meeting, but that this time the grain was upwards, so that the water could find no way to get into the receiver, but thorough the said

" grain : I saw, that in half a quarter of an hour's time, hardly one drop could be driven in, and it made no bubbles at all.

" 2dly, I have also tried with a cork, but I have not found, that any thing could get through, though it seems to be a very spongy body.

" 3dly, I have tried to let a piece of oak wood stand upon the engine for a whole day, and I found, that the water getting along the vessels into the exhausted receiver, did still produce there several bubbles, but not so frequent as in the beginning; which diminution may be ascribed to the obstruction of the pores by some impurities in the water, or by the swelling of the wood.

" 4thly, I have also tried with wood cut sideways, that the water might not get along the vessels, as it did in the third experiment; and I have found, that no water can get through the wood thus cut."

May 13, at a meeting of the COUNCIL were present,

	Dr. LISTER vice-president
Sir JOHN HOSKYNs	Mr. HALLEY
Mr. HILL	Mr. WALLER
Dr. SLARE	Mr. ASTON.
Mr. HOOKE	

It was ordered, that the treasurer give Dr. PLOT twenty pounds for his services done the Society.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair,

There were elected

THOMAS Earl of Pembroke,	Mr. BEAUMONT,
Monf. VILLERMONT,	Mr. LEIGH.

There being some discourse concerning the making of a general index to the Society's registers, it was referred to a council to be summoned to meet on the Wednesday following at eleven o'clock.

Mr. JOHNSON of Canterbury shewed a curious prospect of the cathedral of that city drawn by himself in oil-colours; as also several views of the country adjacent.

Mr. ASTON read part of a letter from Mr. JASSOP of Broomhall, wherein he inquired, whether any of the Society had observed any monthly periodical motion of the quicksilver of their barometers; since upon an experience only of a year and half he suspected, that there are four monthly periods in it, as there are in the ebbing and flowing of the sea.

Dr.

Dr. PLOT communicated part of a letter from Mr. OBADIAH WALKER concerning a swarm of bees at University-college in Oxford, which settled upon an elm branch, that a commoner held in his hand, as he was walking near the hall, and was hived.

A letter of Mr. WILLIAM MOLYNEUX to Mr. MUSGRAVE, dated at Dublin, April 17, 1685<sup>1</sup>, was read, concerning a new sort of hygroscope contrived by himself. A piece of whip-cord about four feet long was fastened at one end to an hook: at the other end hung a pound-weight, so fitted, as to carry an index of a graduated circle. The moisture of the air twists the rope, and gives a motion to the index upon the circle; and the drinefs of the air untwists the cord, and brings back the index.

Mr. HENSHAW mentioned, that he had observed the barometer to be sometimes affected with a south-west wind, as if there were an easterly wind. But he supposed a reason hereof might be, that the wind was east above, though west below.

Mr. HOOKE observed, that some time in a winter before a frost the quicksilver of the barometer has been higher than at any other time of the year.

Dr. PAPIN made a trial, how an acquicrural syphon of ten feet high made of glass would continue to work. After a quarter of an hour it stopped, and the water after an hour and a half's time rested at about two inches from the top. But the bubbles appeared plainly at about eight feet, sticking to the inside of the glass pipe.

May 20. Dr. LISTER vice-president in the chair.

Dr. MILLES presented to the Society in Dr. BRIGGS's name the second edition of his *Ophthalmographia*, much enlarged; which Dr. MILLES was desired to peruse.

Dr. DANIEL COX desired to borrow RAUWOLF's *Itinerarium*; which the library-keeper was ordered to lend him, taking the usual security.

A letter of Dr. PLOT was read, concerning the character to be employed in the *History of Fishes*; some specimens of which being viewed were well approved of: and it was recommended to him, that there might be a border with the Society's arms.

Dr. ROBINSON communicated to the Society a draught of proposals to be made for printing Mr. RAY's *General history of Plants*; which were read, and approved of to be printed in that form, the secretary drawing up a short attestation, and signing it, with the liking of Dr. LISTER the vice-president; and the members present declaring, that when the book should be finished, they would be ready to give a farther and larger testimony of the esteem, which they have of so learned a member.

<sup>1</sup> Letter-book, vol. x. p. 122. It is printed in *Philos. Transact.* N<sup>o</sup>. 172. p. 1032. for June 1685.  
Mr.

Mr. ASTON read two letters, which he had received, one from Mr. JOHN JAMES ZIMMERMAN, dated at Amsterdam; the other from Dr REISELIUS, dated at Stutgard, April 5, 1685\*, desiring, that some books might be sent to the Duke of Wirtemberg, and mentioning, that the requirural syphon had worked at above thirty feet high.

Mr. ASTON was ordered to consult with Dr. PAPIN in giving an account of such experiments, as had been made concerning that syphon before the Society†.

Mr. ASTON communicated a letter to himself from Mons. JUSTEL‡, accompanying a box from Mons. VILLERMONT, wherein were some of those strange honey-combs found in the West-Indies, and formerly mentioned to the Society; together with a piece of natural shagreen; a piece of cinnamon of the river of the Amazons, and another sort from another place; as also a piece of the clove-tree from America.

Mr. HENSHAW said, that to make the ordinary shagreen the afs's skin was boiled, and then strewed with mustard-seed, and pressed to make the skin rise.

The cinnamon tree from the river of the Amazons was no other than the cortex Winteranus.

Mr. HOUGHTON observed, that the true cinnamon and the Jesuit's bark broke stringy; but the cassia or bastard cinnamon more short.

A letter of Sir RICHARD BULKELEY to Dr. LISTER, dated at Dublin, May 5, 1685\*, was read, describing the new sort of chariot or calash made there by one CLEVET, having but two wheels, and not overturning; one wheel being able to go on a superficies above three feet higher than the other: but if it overturns, it is done without any disorder to the person, who sits in the calash.

Dr. SLOANE presented a glass of the water taken from the sweet-smelling earth found at Floxton. It had a very aromatic smell, and was now pretty clear, though it had at first been something white. He said, that a person had drank a pint of it, which gave him two or three stools; and another a quart, without being moved by it. He was desired to draw up an account of his observations concerning the earth.

Dr. AGLIONBY shewed some propofals of a person to furnish a goudron or substance like tar, of good use for ships in preserving them from the worm, and from burning, as it melts without flaming, and was good for caulking. He was desired by writing some of this goudron to the Society.

Dr. LISTER mentioned, that he had received from Mons. SEQUETTE some of his

\* Letter-book, vol. x. p. 143.

† Mr. ASTON's letter to Dr. REISELIUS was dated June 4, 1685. Ibid. p. 144.

‡ Ibid. p. 135.

\* Ibid. p. 126. It is printed in the *Philos. Transact.* N<sup>o</sup>. 172. p. 1228.

crystals, which would melt down at a candle, without flaming or cracking as salt; part of which he would bring to the next meeting of the Society.

The figure of the hygrometer in Mr. WILLIAM MOLYNEUX's letter to Mr. MUSGRAVE, read at the last meeting, was shewn; and Dr. PAPIN ordered to make such an hygrometer against the next meeting.

Dr. PAPIN shewed the experiment how small bodies swimming upon water run together, and cleave to one another, as well where the air comes to them, as *in vacuo*.

May 27, at a meeting of the COUNCIL were present

Dr. LISTER vice-president

Sir JOHN HOSKYNs

Mr. HILL

Sir ANTHONY DEAN

Mr. HALLEY

Mr. COLWALL

Mr. ASTON.

It was ordered, that the members of the Oxford and Dublin Societies residing at Oxford and Dublin, who are fellows of the Royal Society, in consideration of their charges for experiments in those cities for promoting the common end, shall be excused from half their weekly payments, and that only 2*s*. a year be demanded of them for the future:

That the treasurer pay to Mr. ASTON the bill for copying some of the registers, being twenty four pounds eleven shillings and nine-pence, for the use of JOHN WILLIAMS:

That the secretary cause a general alphabetical index to be written out of the particular indexes of the books of the Society.

Mr. WALLER and Mr. HAAK were desired to make an index to two of the minute-books, which had none.

Several of the members of the Society being willing to give one or more plates to the *History of Fibres*, now printing at the Society's charge; it was desired, that they would lend in their money by Mr. HUNT to the treasurer (a guinea being computed to be the moderate rate of each plate) to the end, that their names might be written on their plates, as they came to be engraved.

The council agreed to propose to the Society Mr. MOULT, as a person fit to be employed in making the chemical operations, which should be ordered by the Society.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Dr. TYSON presented to the Society *Neurologia Universalis Raymundi Vieussens Montispeffulensis*, sent from the author.

Upon

Upon mention of the clove-bark given at the last meeting, it was said, that an oil of clove was made of it in the West-Indies.

Dr. GALE said, that ARISTOTLE had mentioned a sugar or honey of maple, curing mad persons, and making sober persons mad.

A letter of Mr. MUSGRAVE was read, mentioning, that he had been written to by Dr. MARK, that the Elector of Brandenburg desired to know the Society's opinion concerning the controversy of Monf. KUNCKEL: that he had commanded him to desire the *Philosophical Transactions* to be sent, and to hold a correspondence with the Society, and to acquaint them, that Monf. KUNCKEL had an art of making red glass like a ruby; another glass like an agate; and artificial amber: and that he desired to have the receipt for making Prince RUPERT's metal.

Dr. LISTER remarked, that the arcanum of red glass was to make the red jet or glass lead, which flows upon nealing.

Mr. HOOKE observed, that the scarlet-red window glass was brought from Germany; but that there had been none brought over for eighty years past.

Dr. GALE mentioned, that he had seen a manuscript 400 years old, intitled *Brantz de tinclurâ Vitri*, which, he said, he would give a farther account of.

Mr. HENSHAW said, that the making of counterfeit amber had been long known here, and that it was done with turpentine gently evaporated and stirred till it came to a consistence: that it was not to be distinguished from true succinum, but by rubbing and heating it; for then it discovered its turpentine smell, whereas true amber has a rosemary smell.

It was ordered, that Dr. PAPIN should try how this counterfeiting amber would succeed.

A letter of Monf. JUSTEL to Mr. ASTON\* was read, mentioning hail-stones, that had fallen at Paris, of four ounces weight, having several plates or facettes like a diamond: that the ground, where truffles grow, smells of them six weeks or a month before they are grown, but not at all when they are grown: that there was made a concave speculum at Paris, five feet eight inches broad, English measure, and weighing 2500 lb. with the case: and that Mr. VAN SIKER, a Dutchman, had made a perspective glass of 180 feet, and was persuaded to make one of 300.

There was read an account of some experiment made by Mr. BALLARD, and communicated from Oxford, relating to some experiments of Monf. KUNCKEL about the mixture of spirit of wine with syrup of violets, milk, and water, in order to the finding out the nature of the spirits, of several sorts of wines, and other liquors<sup>†</sup>.

\* Letter-book, 2<sup>vo</sup>. x. p. 155.

† Ibid. p. 150.

Upon occasion of the different heating of spirit of wine, Mr. HENSHAW queried, whether the spirit of wine made use of were all of it new drawn. To this purpose Dr. TYSON said, that spirit of wine and spirit of nitre mixt in equal quantities made a liquor like blood; but that the experiment would not succeed, unless the spirits were new drawn.

Dr. PIT said, that though spirit of wine well rectified seems to be dephlegmed, because it burns off in a spoon, yet there may be a fallacy, since the heat of the spoon may raise the phlegm. And to this purpose, if a dish of spirit of wine be let in water, to keep it cool, and then be fired, it will have a great deal of phlegm.

Dr. PAPIN brought in an hygrometer made after the manner of Mr. MOLYNEUX.

June 3. Dr. LISTER vice-president in the chair.

A letter of Dr. WALLIS to Mr. ASTON, dated at Marlton St Laurence near Baubury, June 1, 1685\*, was read, giving notice, that he had sent a manuscript treatise of logic with a dedication prefix to the Royal Society.

The book being presented, the dedication was read; and the treatise itself referred to the perusal of Mr. MEREDITH.

Mr. HOOKE read an account of a luminous phenomenon, in colour like the tail of a comet, seen sometimes after sun-set in the west, and at other times in the east before the sun-rising, lying under or near the eclipse, reaching from about forty degrees from the sun to about seventy, being fourteen degrees large, and ending in a point. It had been first mentioned by Mr. CHILDREY in a book printed about 1661†, but seen by him several years before, and since that time observed by Mr. HOOKE; but in 1683 published as a new discovery by Mons. CASSINI at Paris, and since by Mons. FATIO at Geneva.

A letter of Mr. MUSGRAVE to Mr. ASTON‡ was read, mentioning, that he had sent two of the shells of the fish, which yields the purple, from Mr. MAUNDER, chaplain to Colonel LUTTEREL of Dunster-castle in Somersetshire; who would have sent the fish, if it would have kept without being offensive: that the part of it, which yields the colour, was, he said, a thin watry substance in the back, and not enough in one fish to make six or seven letters. That some of the shells are tinged in the inside, others altogether white. Mr. MUSGRAVE likewise sent the patterns of two sorts of lesser or sea-liver-wort, *Lichen marinus Rati*, growing near Minchhead, a black fort and a green.

An extract of a letter of Mons. VILLERMONT to Mons. JUSTEL was read, mentioning a flying fish, which he took off the isles of Porquerolles by Toulon; the mugil or cephalo; the murrena, the shell-fish oursin or herisson;

\* Letter-book, vol. x. p. 141.

† *Britannia Encensata*.

‡ Letter-book, vol. x. p. 145.

and

and the tail of a fish taken at Cayenne, which is like the beak of a parrot.

Upon a discourse concerning the preserving of dead bodies, Mr. WALLER said, that he had seen a dead body, the face whereof looked fresh in a coffin, that had been filled up with melted pitch round the corps.

Dr. PAPIN produced the draught of a fountain of his own contrivance, which being liable to be spoiled by being removed, he desired the Society to appoint some persons to see the working of it for a whole day together, whether it will not run constantly without losing any thing of its strength<sup>a</sup>.

The secretary read his answer to Dr. REISELIUS's letter.

June 10, Dr. LISTER vice-president in the chair.

The secretary was directed to return thanks to Dr. WALLIS for his manuscript treatise of logic, and to mention to him the printing of it.

Dr. TYSON shewed one of the cochineal insects, which appeared to be a lady-fly, and of the beetle-kind. It was delivered to Mr. HUNT to be drawn microscopically.

Dr. SLOANE shewed how the water from the sweet-smelling earth at Hoxton would suddenly change upon an infusion of galls, and be very black.

It was desired, that when Mr. MUSGRAVE wrote to Dr. MARK, he would inquire what likelihood there might be to obtain the copies of any of MARGRAVE's designs of fishes about Brasil, which were said to be in the Elector of Brandenburg's possession; and to mention, that the favour should be acknowledged on the plates.

Mr. HENSHEW inquired, whether Mr. COLE could fix all the several colours said to come from the juice of the buccinum.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, June 6, 1685<sup>a</sup>, was read, returning the thanks of the Philosophical Society there for the Royal Society's remitting half of the weekly payments to such of their members, as resided at Oxford, and contributed to the making of experiments.

He mentioned in this letter, that Mr. COLE said farther of this fish, that to have all those colours, which the liquor of it affords by the help of the sun, the liquor laid on a cloth, &c. must be dried in the morning sun.

He took notice likewise of an old way of making artificial amber to be seen in a manuscript belonging to Magdalen-hall: and

<sup>a</sup> Register, vol. vi. p. 241. It is printed in *Philos. Transact.* N<sup>o</sup>. 173. p. 1093. for July 1685.

<sup>b</sup> Letter-book, vol. x. p. 148.

That

That an old brass key had been given to the Oxford Society, somewhat resembling one part of a clasp for a gown, which was supposed to be very antient, and was brought out of Berkshire.

Mr. MUSGRAVE sent also an account of a piece of watchwork made by one SAMUEL WATSON, a watch-maker at Coventry, shewing the rising, southing, and setting of the sun, his declination and longitude, with the hour of the day; the rising, southing, and setting of the moon, her conjunction and opposition to the sun, the sign and degree, in which she is; the eclipses of the sun and moon; the day of the month in the Julian account; the day of the week; the golden number and epact; the dominical letter, and cycle of the sun, with many other particulars. It was to be wound up but once in eight days, and was not subject to be out of order.

Mr. HOOKE supposed, that it might be the same piece of watch-work, that was in the king's bed-chamber; and was of opinion, that it would not reach the exactness, that was pretended.

A letter of Mr. HUNGERFORD to Dr. PLOT was read, recommending Signor GRANDI, a physician of Venice, as a fit person to correspond with the Society.

Mr. HOOKE made a farther explanation of his opinion about the luminous phenomenon mentioned at the last meeting, illustrating it with several schemes.

A letter of Mr. HEVELIUS to Mr. ASTON, dated at Dantzick, May 19, 1685, N. S.\*, was read, giving notice, that he had sent several copies of his *Annus Climatericus*, newly printed.

A letter of Mons. JUSTEL to Mr. ASTON was read, mentioning some books, which had been lately printed abroad, and Mons. DE VILLERMONT's readiness to send to the Society the filtre for taking the salt out of lye, that has been used.

Two letters of Mons. DE VILLERMONT, one in French to Mr. ASTON, the other in Latin to the Society†, were read, giving thanks for his election into the Society, and promising all diligence in promoting the ends of its institution.

Part of a letter of Mr. LEEWENHOECK, dated March 30, 1685‡, was read, containing some curious observations about the manner of generation from an animal, and not an egg; the crooked shape and stiffness of the Fallopian tubes in a bitch, rendering them incapable of giving a passage to eggs; his finding the animals of male seed in several parts of the cornua of a bitch, that had been lately limed; with a description of the uterus. The rest of the letter was delivered till the next meeting.

\* Letter-book, vol. x. p. 142.

† Ibid. p. 136, 137

‡ It is printed in the *Philos. Transact.* N°. 474. p. 1120. for August 1685.

June 17. Upon mentioning the fixing of colours, Sir JOHN HOSKYNs said, that it had been usual to rub the backside of the paper with alum-water, to preserve the colours on the other side.

It being said, that SWAMMERDAM had used artificial amber for preserving his insects, it was desired, that Dr. SLARE would try the best ways of making it, in order to the preserving the insects in the repository.

Upon mentioning the preserving of plants with gum-water and wormwood, or rather colloquintida, Dr. SLOANE preferred the stitching them down to the book, after they had been pressed between the leaves of the book.

A letter of Mr. MUSGRAVE to Mr. ASTON<sup>a</sup> was read, mentioning, that Dr. COLE of Worcester had seen and measured two large stones voided by the penis<sup>b</sup>.

The latter part of Mr. LEEWENHOECK's letter of March 30, was read, concerning the manner how he conceived the animals in seed to cast their first skin, having a long tail, and to be nourished by the egg; the description of the foetus of a sheep after seventeen days; of the eggs in the ovarium, two of which were red and as big as a pea, when the whole foetus was no bigger than an eighth of a pea: of the description of the animal in the seed of a rabbit: of the uterus of a rabbit two days after it had been with the buck; of another uterus after six days: of the foetus of a sheep three days old.

The secretary was ordered to return thanks to Mr. LEEWENHOECK for this curious letter, and Sir JOHN HOSKYNs proposed to desire him, that he would examine, with his microscope, the eggs of silk worms, that have been impregnated, and those, that have not; it being probable, that those eggs are fit for making a farther discovery; they being likewise not difficult to procure.

Dr. PAPIN having desired the Society to order some person to watch his new fountain for a whole day, to see whether it would perform what he promised; Mr. HUNT and his man were ordered to attend him and relieve one another.

Dr. SLARE presented the Society three boxes containing Swedish minerals:

2. *Minerarum argenti è fodinis Sahlbergicis.*

N<sup>o</sup>. 1. *Minera argenti optima.*

2. *Minera alia haud multo vilior.*

3. *Minera argenti, cui multum plumbi admixtum.*

4. *Bona minera argenti sed saxo commista.*

5. *Minera argenti singularis quæ si cum  $\nabla$  lavatur, tota effluit; quod Germanicè vocamus *des fritz ist trefairslingskip*.*

6. *Minera argenti pura & subtilis à lavatione residua, Germanicè Krymer argenti dictus.*

<sup>a</sup> Letter-book, vol. x. p. 158.

<sup>b</sup> Dr. COLE's Letter is printed in the *Philos. Transact.* N<sup>o</sup>. 175. p. 1162. for Sept. and Oct. 1685.

2. Minerarum ♀<sup>1</sup> è fodinis Falungicis.A. Minera ♀<sup>1</sup> distissima.

B. Alia item bona.

C. Minera ♀<sup>1</sup> multo saxo inquinata.

D. Minera prioribus vilior.

E. Minera ♀<sup>1</sup> vilissima & pauperrima.F. Minera ♀<sup>1</sup> semel tota: *W'n desfriz vander Sa't Roß Reint.*G. Portio mineræ semel liquefactæ: *Doferslein diete.*H. Recrementum minerarum ♀<sup>1</sup> fixum: *Fixt ♀ Disfordens.*I. ♀ secundo fufum, non tamen plane depuratum: *Diswartzen ♀.*

K. Sulphur stillatitium: Trepsh sulphur.

L. &<sup>100</sup> Succicum aliquoties depuratum.

M. Aliud ⊕ adhuc depuratus.

3. Minerarum ♂<sup>1</sup>.α. Minera ♂<sup>1</sup> optima.

β. Alia minera perbona.

γ. Adhuc alia item bona.

δ. Minera ♂<sup>1</sup> communissima.

ι. Recrementum ♂ fixum.

ζ. Minera ♂<sup>1</sup> Laponica, aliquantum ♀æ non tamen planè fixæ continens.

## 4. Talcum Succicum, ut mihi relatum, per se in Δ fluidum.

Mr. Hooke shewed an instrument for the drawing the logarithm line, which, he said, was suppos'd by DES CARTES not to be practicable.

Dr. PAPIN gave the following account of his experiments of keeping fruits in turpentine, and a pear kept *in vacuo* ten months<sup>a</sup>:

“ Being commanded to make some trials about keeping plants in turpentine hardened by evaporation, I have accordingly tried to keep some flowers in the same manner, but I have found, as I had been told by the hon. Mr. BOYLE, that the turpentine being much evaporated requires a great heat to be kept liquid enough, and so is apt to spoil the flowers: but being little evaporated it remains soft and easy to be melted by a moderate heat. Nevertheless I have brought two flowers so kept in softish turpentine; because in length of time the turpentine evaporating more and more may grow harder, and do well enough.

“ The pear, that had been shut up *in vacuo* about ten months ago, and had kept its colour very well for above nine months, is much altered for the present, the factitious air having filled up the receiver and separated the cover from it. If the Royal Society pleaseth to make some trials with the said factitious air upon animals and fire, I have all things ready for that purpose.”

<sup>a</sup> Register, vol. vi. p. 246.

June 24. A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, June 20, 1685<sup>1</sup>, was read, containing an account of the way of making artificial amber, described in a manuscript at Magdalen hall; which was by seething turpentine in an earthen glazed pot till it is as thick as paste, and setting it eight days in the sun; and afterwards drying the things, that are formed, in the sun.

A letter of Mr. CHARLES LEIGH to Mr. MUSGRAVE, dated June 22, 1685<sup>2</sup>, was read, returning thanks for his election into the Society, and describing the sepia in three figures drawn upon oil-cloth: the first as it lies upon its back; the second on its belly; the third dissected. There was also sent a writing with the ink of the sepia, attested by the persons, who were present. He supposed the ink to be made of an austere salt mixt with the slime; and mentioned a decoction of the root of the gramen alopecurinum minus used for the cure of the jaundice; and the bone of the sepia to cure films on the eyes of horses; and that wormwood growing on the mosses yields little fixt salt, and that very black.

Mr. HENSHAW conceived the fixt salt to be black, because it was not calcined.

Dr. TYSON said, that the ink-vessel of the sepia was nothing but its gall-bladder.

A copy of the minutes of the Dublin Society from May 4th, 1685, to the 25th, inclusive, was read, as follows:

" May 4, 1685. A formed stone most exactly resembling a cock was shewn by  
" Mr. ASHE: 'twas found in the midst of a huge lime-stone at the same place in  
" Westmeath, where those formerly sent to the Society were got. He also present-  
" ed thread made in Connaught of the root of trees; its colour very white: 'twas  
" fine and much stronger than usual.

" Dr. MULLEN read a very particular account of the dissection of the mon-  
" strous double cat, mentioned in the minutes of February 23, 1685, and ex-  
" plained all the figures accurately.

" Mr. ASHE produced an account of the wind, weather and hight of the mer-  
" cury in the barometer for the last month, taken at Trinity-college.

" May 11. A letter was read from Mr. MUSGRAVE, dated March the 31st,  
" 1685, containing several observations of Dr. TURBERVILLE of Sarum: the  
" minutes of the Oxford Society, from March 10th to the 31st, were read: the  
" thanks of the Society were ordered to be returned for them, and a copy of Dr.  
" PLOT's desiderata in chemistry desired.

" Mr. MOLYNEUX observed upon occasion of Dr. LISTER's account of the  
" motion of the mercury in the barometer for the last year, that the hights thereof  
" were not always equal in London and here, yet they did generally rise and fall  
" together, especially in all remarkable changes.

<sup>1</sup> Letter-book, vol. x. p. 182.

<sup>2</sup> Ibid. p. 164.

<sup>3</sup> Ibid. p. 166.

“ A draught of the vessel found in York, sent by Mr. MUSGRAVE, was shewn.

“ Mr. MOLYNEUX presented the description and draught of a very ingenious hygroscope or weather-clock (as he calls it) invented lately by him, which by a piece of whip-cord and a weight with an index, shews the least alteration or variety in the moisture of the air.

“ Mr. MOLYNEUX going for England, Mr. ASHE was chosen secretary.

“ May 18. Dr. WILLOUGHBY in the chair.

“ The minutes of the Oxford Society from March 31 to April 23, 1685, were read, and the thanks of the Society ordered to be returned for them.

“ Upon reading the account of Dr. WALLIS's extracting the root of a number of fifty three places in the dark; the Society was informed, that one of their members had by the help of memory easily extracted the root of a number of thirteen or fourteen places, going on in an arithmetical progression of odd numbers, as 1, 3, 5, 7, &c. and could have proceeded with equal facility. He supposed also that the root of an unity with many cyphers might be so extracted with yet greater ease. Query, whether the doctor had any particular method for the doing of this.

“ A copy of Mr. LEEWENHOECK's letter concerning the salts of wine and vinegar, &c. was desired; as also Dr. GARDEN's discourse of the weather.

“ The demonstration of MERCATOR's proposition *De Quadratura Circuli* (if not printed in the *Philosophical Transactions*) was earnestly desired by the Society, and Dr. WALLIS's thoughts of it.

“ Mr. ASHE presented a very odd insect, which grew to a tree in a large husk or shell, together with a letter to him, giving an account thereof, and the history of insects in general from Monf. DORCHAIRE: the thanks of the Society were ordered to be returned for this letter.

“ Dr. MULLEN gave an account of a patient of his, who had a frequent strong pulse in the very top of his head, which seemed to shoot up from his heart: when the pulse beat most strongly, there was a total intermission in the wrists; when it beat weaker in the head, there was a defection and remission in the pulse of the wrists: whence he collected, that the circulation of the blood might, perhaps, be wholly stopped downwards, when this extraordinary pulse happened in the head.

“ Mr. ASHE informed the Society, that he lately saw in the country a horse, whose yard was fixed about two inches below the anus: 'twas in as large proportion as any other horse has, and when erected stood prominent from the buttock: it had also two teats under the belly: it seemed to have all the cou-

“ rage and vigour of stone horses, but to want their lust or appetite for mares.  
 “ This gave occasion to Dr. WILLOUGHBY to discourse concerning hermaphrodites, one especially (that passed for such) which he saw in Dublin, and of  
 “ which he gave the Society an account. Mr. ASHE likewise related the history  
 “ of the gentlewoman in town, who upon sight of a natural, that was carried  
 “ about to beg, brought forth exactly such another, not only resembling it in  
 “ features, and particularly in the red eyes, like those of a ferret, but also imi-  
 “ tating all his awkward gestures. He produced some of the hair of each, both so  
 “ remarkably white as not to be distinguished.

“ Dr. MULLEN gave an account of a monstrous chicken with two bills, and al-  
 “ so of an egg, which at the big end had a fleshy substance in figure like a glass-  
 “ drop, the smaller part hanging out, at the extremity of which was a drop of  
 “ blood: the shell was not quite closed. This fleshy substance taken out was as  
 “ big as the largest glass-drop, included in a membrane very tough; the inside  
 “ a collection of thin small tunicles crammed close in that membrane, the yolk  
 “ and white much less than ordinary. Accurate figures hereof are taken by Mr.  
 “ SANDYES. Dr. MULLEN then undertook to give an account to the Society out  
 “ of antient and modern observations, what has been said of great and remarka-  
 “ ble stones, taken out of the bodies of animals.

“ Mr. TOLET was then nominated treasurer in Mr. PLEYDELL's place.

“ May 25. Mr. ALAND, a gentleman of Waterford, communicated to the So-  
 “ ciety a method of finding the longitude by considering the distance of the moon  
 “ from the sun, its latitude from the ecliptic, and distance from other planets.  
 “ He has invented a particular scale to reduce planets to the ecliptic, and another  
 “ instrument to take their distances: he professes to have made a dozen observa-  
 “ tions, and not erred two minutes, which error he imputes to the smallness of  
 “ his instruments. Ordered, that Mr. KING, Mr. TOLET, and Mr. ASHE do  
 “ examine this method, and give an account thereof to the Society the next  
 “ meeting.

“ Mr. TOLET discoursed of the history, and several ways of finding the longi-  
 “ tude hitherto thought of, with their particular inconveniences.

“ Sir, I here send you our minutes from May 4th to the 25th. I suppose  
 “ Mr. MOLYNEUX has communicated all before that time. I have likewise in-  
 “ closed some of the hair so remarkably white, mentioned in the minutes of May  
 “ the 18th, &c.”

There was produced part of the cochineal fly drawn microscopically;  
 As also proofs of six plates of the *History of Fishes*.

A copy of a letter of Dr. LISTER to Mr. RAY \*, containing some observations  
 about birds, which might be added to the *Ornithologia*, was read.

\* Ibid. p. 184. It is printed in the *Philos. Transf.* N°. 175. p. 1159. for Sept. and Oct. 1685.

A letter of Monf. JUSTEL to Mr. ASTON, dated June 17, 1685<sup>2</sup>, was read, mentioning a burning concave at Paris of five feet and one inch diameter, being a portion of sixty degrees; but that it performed little more than those of thirty three or thirty four inches; of which opinion was also Mr. HOOKE.

This letter and another of Monf. JUSTEL<sup>1</sup> mentioned likewise a sample of silk from the Antilles finer than the East-Indian; a curious plant of St. Christopher's, called echino-melocardus, and another called frangipane; a sort of mirobolans of Martinico; a piece of West-Indian wood smelling like human excrement; virgin sugar, which condensed in the canes; a sort of fish with a body like a leech brought from Strasburg, moving in its mud against change of weather, serving as it were for a barometer.

An account was given of the watching of Dr. PAPIN's fountain for about four hours, in which time it might be conceived, that all the water circulated above a hundred times.

It was desired, that Dr. PAPIN would make one for the Society, as soon as the time shall be expired, that he had set for discovering that contrivance.

Dr. PAPIN brought some flowers included in amber, which were approved of, though the amber was conceived to be a more proper covering for insects; a trial of which he promised at the next meeting.

He put some living flies into factitious air made from a pear, that had been shut up *in vacuo* eight months; but though, he said, several fishes had died suddenly in it, yet it did not now succeed, the vessel having been too often opened.

Upon occasion of an antient key mentioned to have been shewn the Philosophical Society at Oxford, Mr. HENSHAW produced two old Roman keys and several other antiquities, as a stylus, a fibula, two *res turpicele*, a ring, two dice, one iron, the other ivory, a lunula, some pieces of coloured paste or glass, some of the plaister of the *piscina mirabilis*, and a brass Egyptian teraphim; which the Society desired might be left with Mr. HUNT for two or three days, in order that drawings might be made of them.

July 1. Dr. LISTER vice-president in the chair.

It being said, that the ink-vessel of the sepia is the gall-bladder, Dr. LISTER doubted, whether any animal could so easily part with the gall, or had any vessels to carry it directly out of the body.

A letter of Monf. VILLERMONT to Mr. ASTON, dated at Paris, July 4, 1685, N. S., was read, describing his filtre for taking the alkali salt out of the lye or fuds, which was employed for washing linen, so that the salt is not diminished in quantity or virtue. It was thus: Take quick-lime, and let it be two or three days

<sup>1</sup> Letter-book, vol. x. p. 191.

<sup>2</sup> Ibid. p. 192.

<sup>3</sup> Ibid. p. 160.

a slaking,

a flaking, till it is almost in powder; then take six tubs having each a whole at the bottom, and fill them about nine or ten inches high with lime and ashes stratum super stratum, each bed being about an inch deep. Place the tubs so, that the water draining out of the first may be easily received, and put successively into the other tubs. By this means the salt of the lye will be exalted, and the greafe and foulness taken away. The tubs may be covered, and set by, being serviceable till they are so full of greafe, that the water will not pass. The ashes being greasy are fit for fewel.

Dr. PAPIN was ordered to make the experiment before the Society.

A letter of Mr. MUSGRAVE was read, together with a discourse of Dr. ALLEN MULLEN made before the Dublin Society upon the dissection of a monstrous double cat, some of the parts being likewise explained by figures<sup>f</sup>.

Dr. PAPIN shewed some Spanish flies, which he had included in turpentine hardened by evaporation. The turpentine being somewhat clammy, the flies were left to be dried in the sun.

He proposed a way for making crystallisations *in vacuo* by joining two cylindrical vessels (one that contained the liquor to be crystallised, the other empty) in an obtuse angle; by which means when the vessels are exhausted, the vapours may easily pass out of the vessel of liquor made more hot into the empty vessel, which is cool, and make way for the salts to crystallise.

It was ordered, that this experiment be made at the next meeting.

July 8, at a meeting of the COUNCIL were present

Dr. LISTER vice-president

Sir JOHN HOSKYNES  
Mr. HOOKE

Mr. HILL  
Mr. ASTON.

It was ordered, that the treasurer pay to Dr. PAPIN a quarter's salary, being seven pounds ten shillings.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, July 4, 1685<sup>g</sup>, was read, mentioning, that a great part of the university being in arms<sup>h</sup>, the Philosophical Society there was broken up for some time; and communicating an account of the dissection of a monstrous kidney made by Dr. HUOLAGHAN at Dublin upon the 17th of January, 1687. It was the right kidney of a man of

<sup>f</sup> This discourse of Dr. MULLEN is printed in the *Philos. Transact.* N°. 174. p. 1335, for August 1685.

<sup>g</sup> Letter-book, vol. iv. p. 183.

<sup>h</sup> On occasion of the rebellion under the Duke of Monmouth.

about fifty years old, and weighed forty ounces. The most remarkable parts in it were represented in six figures. The fifth and sixth figures were supposed to be polypus's in the kidney.

Dr. LISTER desired, that it might be inquired what extraordinary symptoms had been observed in the man, whose kidney was thus swollen.

There was read a continuation of the account of boiling and other fountains by Dr. TANCRED ROBINSON, together with some observations on the French macreufe and the Scots barnacle\*, confirming the macreufe to be the *scoter* or *anus niger minor* described by Mr. RAY in the *Ornithologia*, and mentioning some other particulars relating to birds.

Mr. HENSHAW shewed the Society some more antiquities, as a glass tessera; an amulet of the Gnostics; an ancient picture of the virgin; a cameus or mixture of several Gods; a ring of Corinthian brass, with a mask of Silenus in a sardonix; with some others, which were left with Mr. HUNT to be copied.

Dr. PAPIN gave an account, that a solution of sugar had been two days crystallizing *in vacuo* by the way proposed at the last meeting, and was not yet fit to be taken out. He proposed another way for a quicker dispatch.

He likewise brought some factitious air made of raisins, in which flies, that were put, died presently, and fire, that was put in, was immediately extinguished.

There were shewn some of the plates of the *History of Fishes*, which had been engraved at Oxford.

Mr. HILL having mentioned a passage in PLUTARCH, relating, that ALEXANDER had found in Susax 5000 talents of purple, which had been kept 200 years, and was yet fresh, Dr. LISTER supposed it not to have been the colour, but garments died.

July 15. Dr. LISTER vice-president in the chair.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, July 11, 1685<sup>7</sup>, was read, containing an extract of one from Mr. LEIGH to himself, mentioning, that in January preceding in the balsamic earth in Lancashire formerly spoken of, was found a perfect buck standing upon his feet, his flesh whole, and not in the least putrified, the skin and hair sound, the eyes perfect, the horns soft, but growing hard, when brought into the open air. It was queried how long he supposed the buck might have been there.

Mr. LEIGH's letter mentioned likewise a calf, which he had seen the week be-

\* Printed in the *Philos. Transact.* N<sup>o</sup>. 172. p. 1036.

† Letter-book, vol. x. p. 183.

fore, whose skin was inverted, the fleshy side being outward, and the hairy side next to the fleshy pannicle.

It mentioned also a sort of peat making so strong a fire, as to flux a gold ring; and a tumor in a man's intercostals, which voided every day a fat substance as big as a nut.

Dr. LISTER remarked, that some peats make a very strong fire: that at Appletreewick their lime-stones were all burnt within; that peat being bituminous metals might flux with it, as we see tin ore does with rosin, though with salts it all flies away.

Mr. HENSHAW said, that a glow-worm held in the hand left shining, as a piece of rotten wood held near the fire, till it recovers itself by lying in the cold air.

A letter of Monf. JUSTEL to Mr. ASTON<sup>\*</sup> was read, mentioning, that a glow-worm shut in a fir-box had made the box transparent, though a coil of fire would not do it: that Monf. VILLERMONT had a wreath sent from Cayenne of about an inch thick, and three inches and a half diameter, the sides whereof being pressed with a twenty pound weight lengthened to a foot; and upon withdrawing the weight returned to the former size and shape. From a passage quoted from a Spanish author it was said to be a sort of gum, that had an extraordinary spring.

There were likewise sent from Monf. VILLERMONT the figures of a star-fish, and of the fruit of the cinnamon of the Amazons, seeming to be like a pine-apple.

A letter was read from Mr. St. GEORGE ASHE, secretary of the Dublin Society, to Mr. ASTON, dated July 4, 1685<sup>\*</sup>, returning thanks to the Royal Society for remitting half the payments to their members, who were of the Dublin Society, and communicating a copy of the minutes of that Society from June 1 to June 29, as he had in a former letter of May 30 those from May 24 to the 25th inclusive<sup>†</sup>. These minutes were as follow:

" June 1, 1685. This meeting was wholly taken up in reading Mr. ALAND's paper about the longitude, and discoursing thereon.

" June 8. This being Monday in Whitson-week, our meeting was adjourned.

" June 15. A letter from Mr. MUSGRAVE, dated May the 21st, was read, containing Dr. GARDEN's ingenious discourse of weather: the thanks of the Society were ordered to be returned for it. Some assertions of the doctor's therein gave occasion to the following queries to be considered and examined.

" 1, Whether when it happens to rain, as the mercury rises in the barometer, the wind still changes?

<sup>\*</sup> Letter-book, vol. x. p. 154.

<sup>\*</sup> Ibid. p. 174.

<sup>\*</sup> Ibid. p. 166.

" 2dly,

“ 2dly, Whether when the wind turns to north, north-east, or north-west, the mercury always rises ?

“ 3dly, Whether at the rising of the winds, the mercury generally subsides ?

“ 4thly, Whether the extreme highs in the barometer, (which were observed by Mr. MOLYNEUX to happen at the same time here, and at London) were highest here or there ?

“ The same letter gave occasion to Dr. WILLOUGHBY to relate an account he had from ATHAN. KIRCHER of a way of solving an odd meteor, which happens about Rhegium in Italy, every year in the hottest months, viz. the appearance of cities and men walking in the clouds ; that the shore and country thereabouts abounds with antimony and selenites stones, the vapours drawn up from which are specular, and of the nature of looking-glasses, so that a small church upon a hill grows into a city, and two men walking or fighting will be multiplied into an army.

“ He also gave a conjecture how the trade of selling winds was performed in Lapland, &c. viz. by a constant diligent observation, they foreknow the most notable changes thereof, which are more regular and stated in those colder countries, than with us : and hence it is, that the seller will determine his wind to such a day, but not any particular one, which the chapman requires.

“ A letter from Mr. ASTON, June the 4th, was read; and thanks were ordered to be returned to the Royal Society for the great honour and encouragement done to us, in obliging our members (which were also fellows of their Society) to pay but twenty six shillings a year contribution.

“ In relation to Mr. RAY's *History of Fishes*, which is setting out, every one promised by his inquiries and endeavours to promote it, and to bring in what information they could get. Dr. PAPIN's way of raising water was earnestly desired, if not soon published ; and also a more particular account of the monthly periodical motion of the mercury, and of the experiment of bodies in water uniting *in vacuo*.

“ Ordered, that the experiments of water passing through bodies, mentioned in this letter, be repeated by Mr. ASHE and Mr. SMITH.

“ Dr. SILVIUS presented the new *Journal de Medecin*, and gave the Society an account of the disputation *De Acido et Urinosa* between VOIGT and KUNCKELL, which he was desired to examine.

“ June 22, The minutes of the former meeting being read, this query was ordered to be added to the former :

“ Whether the motion of the mercury was a more certain indication of the weather in the morning, at noon, or in the evening ?

“ Dr. HUOGLAGHAN informed the Society, that having dissected the child with two heads, three arms, &c. mentioned formerly, he found, that all the inward parts were double, except of the liver (which was as big as two livers) and heart not much above the ordinary dimension.

“ A letter from Mr. MUSGRAVE, dated May the 29th, was read, containing the figures of a large stone of the bladder; the earthen vessel found at York, and a shell taken out of the ureter of a woman; and likewise Dr. WALLIS's discourse concerning the air's gravity in pursuance of Dr. GARDEN's. Half of this discourse was read, and upon mention of the air's spring as one of the causes of wind, Mr. TOLET observed (as a confirmation thereof) that in the late fire of the castle of Dublin, the glass windows of a gallery were all forced inwards, the external air pressing in, as the spring of the other was weakened by rarefaction.

“ Mr. ASHE gave an account, sufficiently attested, of a man in Gallway, who suckled his child for nine months: the father and daughter are now alive both, the former having yet hanging breasts like those of nurses. A more full account hereof was ordered to be brought in.

“ Information given of a monstrous fish with two hinder feet, taken upon the shore at Myrean: this will be seen and examined.

“ June 29. The monstrous fish, mentioned in the last, was shewn: it is four feet seven inches  $\frac{1}{2}$  long with its tail, two feet seven inches  $\frac{1}{2}$  broad with the fins: the head two feet two inches  $\frac{1}{10}$  round, is like a shark's; its mouth is eight inches  $\frac{1}{2}$  wide, having four rows of very sharp teeth; it has two broad fins by the shoulders, and two lesser ones at the insertion of the tail, near the extremities of which fins grow out two very strong feet six inches  $\frac{1}{2}$  long, with joints and hollow hoofs; its tail is two feet three inches  $\frac{1}{2}$  long, much narrower than the body, and distinguished by several vertebrae. It was dried and salted before we saw it, so that nothing remarkable within could be observed. Our seamen and fishermen affirm they have not seen any fish like it: the figure hercot is ordered to be taken by Mr. SANDYES.

“ Dr. MULLEN presented some urns with the bones and ashes contained, found at Dontrilegue in the county of Cork, with a letter giving an account thereof from Mr. ANTHONY IRBY. They were taken out at three foot deep, being fifteen in number, each having a small round stone on the top for its cover; some contained a pottle, others a quart, and the least a pint. Ordered, that the thanks of the Society be returned for this present and the letter.

“ Mr. SMITH also informed us of urns found at Warringtontowne in the county of Down in a Dane's fort: there was a small building of stone about the cavity, containing a large urn with several small ones: one of these is presented to the college library.

" A letter from Mr. MUSGRAVE, dated May 30th, 1685, was read, containing some minutes of the Oxford Society. Upon reading Dr. LISTER's proposal for cutting the stone by the os pubis, Dr. MULLEN informed, that this way of section is treated of by one VAN RHUINHUYSE; and Dr. DUN assures, that such a method has been long practised in France.

" Some of Mr. BELLARO's experiments were tried, viz. river water poured into a like quantity of spirit of wine grew only luke-warm, as KUNCKEL affirms. The like also succeeded in spirit of wine mixed with water, which had salt dissolved in it. Ordered, that the other experiments be repeated at our next meeting.

" A stone resembling a bird's wing, sent by Mr. FOLEY.

" Mr. SMITH also affirmed, that near Loughbricklan in the county of Down, upon removing a heap of stones to repair a bridge, the mouth of a cave was discovered, in a large room of which was a building of stone, containing two great urns: these by the eagerness of the searchers (who supposed them to hold money) were instantly broken."

Mr. ASTON was directed to desire Mr. ASHE to send over the figure of the monstrous fish, that it might be communicated to Mr. RAY.

Dr. PAPIN shewed the dissolution of sugar, which had been four days crystallizing *in vacuo*. It was not like sugar-candy, but like a sugar-loaf.

He likewise brought a large and more compleat draught of the vessels designed for the hastening evaporations and distillations by means of vacuum, the apparatus being conceived to be of use in the making of salt, copperas, and other things made by evaporation.

The experiment was ordered to be made in a small vessel at the next meeting.

Dr. LISTER presented a poem by Dr. ROBERT GROVE *De Sanguinis Circuitu*.

He likewise shewed the case of a bird of the jay-kind not described by Mr. RAY, and called in some places a silk-tail; which was delivered to Mr. HUNT to take the figure of it.

Dr. SLARE gave in an account of experiments, which he had made with a piece of mineral called kobalt, which had been sent him from Germany: which account was ordered to be registered as follows:

" I have had by me a good large piece of a mineral ore, sent me as a great rarity from a physician to the Duke of Zell, under the title of cobalt and *minera argenti*.

\* Register-book, vol. vi. p. 259.

" The substance of this ore looks somewhat white, and shining, especially when it is first broken: from this external aspect it may perchance derive the name of *minera argenti*: the miners call it *coobalt*. It breaks almost every where mixt with veins or specks of stone or spar.

" This ore comes out of Saxony, the like being yet to be found no where else: they make it as criminal for any to carry it away before they have prepared and disguised it, and by some additions have brought it to that, which they term *zaffera*, which seems to be a corruption of another word from the misfortune of the German pronunciation: they bear so hard upon the *s*, that they often make a *z* of it, inasmuch that I have often observed the young tyros in the Latin tongue, that have put in writing such Latin words they have learned or heard from their masters, to make these mistakes very usual, writing *sapiens* and the like with a *z*, *zapiens*: nor do I doubt but they have a respect to the effect or product of this stone, which is the *sapphire-blue* it resembles: so that by *zaffer* they would indicate the *sapphire* made by this preparation.

" In the repository I find a little fragment of a stone sent by Dr. PLOT, which has the character of *metallum zaphoræ* given it; and another paper with *zaffera* writ upon it, with this interrogation, whether it be an earth?

" Dr. MERRET\* has been very inquisitive about it, in his observations on the 12th chapter of the first book. He examines CARDAN, who calls it an earth, *CÆS-ALPINUS*, who reckons it among stones, and SCALIGER, who passes it by untouched. Whereupon he concludes it an artificial composition of brass, sand, *lapis calaminaris*, but not without some diffidence.

" Having shewn this ore to several curious persons, I never met with any that knew it: for that reason, before I presented it to the Society, which I dare now venture to do, I was willing to try, whether it were really the same thing, which it was commended to me for. In the prosecution of these experiments we may come to some reasonable account of the nature of this ore.

" Dr. MERRET's conjecture of its being an artificial preparation is made void by this very present, which shews itself to be a true ore or mineral.

" The name given it in the repository of *metallum zaphoræ* is somewhat erroneous; for this mineral will afford no metal, and scarce any *regulus*; which antimony plentifully does: nor will it melt down, but in strong fires it evaporates.

" In order to the preparing it for use, our first operation was calcination. This we did after it had been powdered, by putting it into an iron pan, and stirring it up and down, when it was red hot. In this condition it will smother so long until it be prepared.

\* Who published at London 1662, in 8vo, a translation from the Italian of ART. NERI's *Art of Colours*, *how to colour Glasses*, &c.

" The smoak, that rises from this mineral, is arsenical : for in Germany, where they prepare great quantity, they preserve the white flowers by catching them in an arch built over the calcining furnace, and they are again sublimed into a close arsenic : we could plainly see these white flowers rise out of this ore.

" When the ore has been thus prepared, if you reverberate it a little farther it will be somewhat the richer ; yet there is no necessity, for we have made it do very well after the first preparation : and this is the true zaffer.

" The way used by the Germans to disguise and increase the thing they call zaffera :

" Take of this prepared powder one part of calcined, and pulverised pebbles, or fine sand two parts ; mix all well together, and moisten it with water, so that it may be put up in barrels. This in a short time will become as hard as a stone, and must be broken in pieces with iron hammers. The sand is super-added to increase the profit of the commodity.

" The common proportion of this zaffera, to give a sapphire tincture to the matter of glass, is three grains to an ounce.

" In our experiments, we have too deeply tinged the glass ; for that piece of glass, N°. 2, though it had but two grains to an ounce, yet it proved too much, for I believe a grain, or one and a half at the most, will suffice, this being as deep again as it need to be.

" That, which has N°. 4. had four grains of the zaffera well rubbed and mixed with an ounce of our vitrifying matter, which is in the lump almost quite opaque, being made thin, and polished on a stone makes but a dirty dull colour.

" Note, that these experiments were made in crucibles for expedition, and rather to shew the true nature of the ore, than to make fine glass ; for this has specks and blebs, but we regard here only the tincture.

" Next week I intend to bring some of the true zaffer, and also of the sophisticated, as it is sold to us, made of the mentioned true zaffer ; and also the stone, which makes our blue starch, which is also made of this ore."

Mr. Hooke shewed some farther use of his instrument for describing spiral lines ; which he was desired to print, or, to give a copy to be entered in the Society's books.

July 22, at a meeting of the COUNCIL were present  
SAMUEL PEPYS, Esq; president

Sir CYRIL WYCHE

Dr. LISTER

Mr. HENSHAW

Mr. HILL

Mr. HOOKE

Mr. ASTON.

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It was ordered, that two copies of Mr. HEVELIUS's *Annus Climaticus* be sent as presents from the Society, one to the Philosophical Society at Oxford, and another to that at Dublin; and that the secretary give them notice thereof: and

That Mr. FLAMSTEAD be excused his arrears of the weekly payments till Michaelmas last.

It being represented, that several members of the Society were in great arrears, contrary to the statutes; it was ordered, that the following names should be left out of the list next to be printed, unless they should satisfy the treasurer in the mean time.

ARTHUR Earl of Anglesey  
Dr. ARDERNE  
Sir ROBERT ATKYNS  
GEORGE Duke of Buckingham  
Mr. JOHN BEMBDE  
Mr. WILLIAM BRIDGEMAN  
Sir JOHN BROOKE  
Dr. BURNET  
WILLIAM Earl of Devonshire  
CHARLES Lord Clifford.  
Dr. EDWARD CHAMBERLAYNE  
Sir. JOHN CHARDIN  
Sir WILLIAM CHURCHILL  
Dr. CLARKE  
Mr. PETER COURTHOP  
Mr. THOMAS COX  
Lord Dursley  
Sir RICHARD EDGECOMBE  
Mr. HENRY EVE  
Sir B. GASCOIGN  
Sir EDWARD HARLEY  
Sir JAMES HAYES  
Mr. JODOCUS KRULL  
Mr. JOSEPH LANE

Sir JOHN LAURENCE  
Dr. JOHN LOCKE  
Dr. MERRET  
Dr. DANIEL MILLS  
Mr. WILLIAM NAPPER  
Mr. THOMAS NEALE  
Mr. J. NEWBURY  
Sir THOMAS PLAYER  
Sir WILLIAM PORTMAN  
Mr. HENRY POWLE  
WILLIAM Earl of Strafford  
Sir JAMES SHAEN  
Mr. THOMAS SHERIDAN  
Dr. G. SMITH  
Sir WILLIAM SOAME  
JOHN Earl of Twedale  
Sir GILBERT TALBOT  
Sir JOHN TALBOT  
PHILLIP Earl of Leicester  
Sir PATIENCE WARD  
Sir GEORGE WHEELER  
Mr. WILLIAM WINDE  
JOHN Lord Yester.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Upon reading the minutes of the last meeting Mr. HOOKE produced a transcript of a passage in Mr. KUNCKEL's book *De Arte Vitraria*, which he had procured a translation of; agreeing with the account, that Dr. SLARE had given of kobalt and zaffer, and confirming what his experiments had made out.

There were read some papers communicated by the Dublin Society; as a letter of Dr. CHARLES WILLOUGHBY and one of Mr. GEORGE TOLET to Dr. WIL-

<sup>4</sup> He had taken the degree of bachelor of physic, February 5, 1675.

LOUGHBY<sup>c</sup>, containing his answer to one HERNE, who had appealed to the Royal Society and the Philosophical Society at Oxford, to determine a question about the situation of the lines of longitude and latitude on the terrestrial globe; Mr. TOLET affirming the line of longitude to lie north and south, and the line of latitude to lie east and west; and Mr. HERNE asserting, that the line of longitude lies east and west, and the line of latitude north and south. The rest of the papers being a problem about gunnery sent by Mr. HALLEY to Mr. WILLIAM MOLYNEUX, and two problems of Mr. TOLET relating to the same subject<sup>d</sup>, and requiring calculation, were referred to Mr. CLUVERUS to examine, and make a report of at the next meeting, when they should be farther considered of.

Mr. HOOKE read a discourse relating to the Chinese character, and their way of casting account<sup>e</sup>, which he compared to, and illustrated by the antient Roman abacus.

He was ordered to procure a Roman and a Chinese abacus to be made, and to be kept in the repository.

Dr. PAPIN made a trial of Monf. DE VILLERMONT's way of separating the grease and foulness from the lye, that had been used: his account of it was as follows<sup>f</sup>:

"The foul soap-water, that I began to filtrate a week ago, could not wet the  
"filter thoroughly in about an hour's time; although the filter was prepared ac-  
"cording to Monf. VILLERMONT's directions; yet I must confess, that my  
"vessels being but a foot high could not be so fit for a quick operation as his  
"may be. The next day I stood again near an hour before I could get any drop  
"from the filtre: at last it began to work but slowly: and after I had got near  
"eight ounces of filtrated liquor, I carried four ounces of it to the hon. Mr.  
"BOYLE, that found it of a strong lixiviate taste, and having caused it to be e-  
"vaporated, he found . . . . of lixiviate salt, that was a little oily, because it  
"had been filtrated but once. I have brought it hither with the rest of the fil-  
"trated liquor. If the Royal Society please, I will take the vessels home with  
"me, that I may try more at leisure, how quickly the filtre works; how many  
"times it may serve; and how much salt may be recovered by a certain quantity  
"of quicklime and ashes."

July 29. Dr. LISTER vice-president in the chair.

Upon the mention in the minutes of the last meeting, Dr. LISTER supposed, that kobalt might be a sort of antimony, though it contained but a small quantity.

Mr. CLUVERUS gave an account, that he had read the papers transmitted from Ireland: that he conceived the contest between Mr. TOLET and Mr. HERNE

<sup>a</sup> Letter-book, vol. x. p. 175.

<sup>b</sup> Ibid. p. 175.

<sup>c</sup> Printed in the *Philos. Transact.* vol. xvi. N<sup>o</sup>.

180. p. 63 for March and April, 1686.

<sup>d</sup> Register, vol. vi. p. 252.

about

about the longitude to be grounded upon a misunderstanding of one another; for that the longitudes or latitudes themselves are different from their determinations. Mr. HERNE talks of the longitude without a determination; and in this manner the line of longitude is always an arch of the equator lying east and west, as latitude is an arch of the meridian stretching north and south. But Mr. TOLER speaks of the determination, that is of the lines, which shew the bigness and longitude or latitude; and these lines, that give the bigness of longitude, lie north and south, but those, that comprehend the latitude, lie east and west.

He took notice likewise, that the Spanish geographers reckon the longitude from east to west (whereas other nations do from west to east) because of their frequent sailing to the West-Indies; it being easier to say 1, 2 and 3, than 359 and 358, &c.

A letter of Mr. MUSGRAVE to Mr. ASTON, dated at Oxford, July 25, 1685<sup>t</sup>, was read, mentioning *lignum fossilis*, *cornu ammonis*, and *ostracites*, dug out of a well near Faringdon; an egg-shell having a loose cap rising up at one end of the same matter with the shell; and a wild Virginia rat's skin above four feet long from the nose to the anus.

A paper was read, which had been sent from Dublin, being an answer of Mr. EDWARD SMITH, fellow of Trinity-college in Dublin, to some queries proposed by Mr. WILLIAM MOLYNEUX, concerning Lough Neagh<sup>t</sup>.

Dr. LISTER remarked, that though Mr. SMITH denied, that he had ever heard, that the water of the Lough petrified, but the earth, yet he had been informed otherwise of that place; and that it appeared to him, that the water did petrify in other places.

A letter of Mons. JUSTEL to Mr. ASTON<sup>1</sup> was read, mentioning, that a friend of his at Paris had found out a way to teach in a quarter of an hour two men, who did not understand one another, to communicate their thoughts: that the machine to go under water was finished and performed very well: that an intire pear had been found under a bulwark, at the gate of Paris near the temple, which was well coloured and unperished, though it must have lain in a black earth above a hundred years: that Mons. PERROT had contrived a new sort of organ: that a German pretended to raise up the King's statue, of 20 or 30000 weight, with a cord of a quarter of an inch thick and a double pulley, by a child of twelve years old; and to carry a bell of 32000 weight to the top of Notre Dame with a cord as big as one's finger and double and treble pulleys, by a girl of twelve years of age.

A curious model of a double bottomed ship was presented by Mr. HOUGHTON in the name of Mr. JOHN WORLIDGE of Petersfield, which had been made some years before by his brother, Mr. WORLIDGE, a gold-smith at Portsmouth. A

<sup>1</sup> Letter-book, vol. x. p. 203.

<sup>t</sup> Ibid. p. 248. It is printed in the *Philos.*

*Transact.* No. 174. p. 1108. for August 1685.

<sup>t</sup> Letter-book, vol. x. p. 274.

paper of the description and excellency of the vessel being read was sent with it to the repository, being first entered in the letter-book \*.

Mr. Hooke brought in a model of the Roman and Chinese abacus, which he had caused to be made for the repository, and continued his discourse about the Chinese language.

Dr. Papin made the experiment of distilling *in vacuo* according to the method, which he had before laid down, and which had been approved of.

The Society adjourned till towards the term, at which time a summons was to be sent out for their meeting again.

Sept. 18, at a meeting of the COUNCIL were present

Dr. LISTER	SAMUEL PEPYS, Esq; president
Mr. HILL	Mr. Hooke
	Mr. ASTON.

The president having authorised HENRY FAITHORNE, bookfeller, to be one of the printers to the Royal Society, he took his oath accordingly.

It was ordered, that HENRY FAITHORNE print a book intitled *Historia Plantarum*, written by Mr. JOHN RAY, fellow of the Royal Society; and the licence was accordingly signed by the president.

Octob. 28. Dr. LISTER in the chair, the SOCIETY met again at Gresham-college, having been summoned in the usual manner.

Four letters of Mr. MUSGRAVE to Mr. ASTON, dated Aug. 1, Oct. 11, Oct. 19, and Oct. 25<sup>th</sup>, were read; the first mentioning the sinking of several woods in water; the measure of EDMUND MELLOONE, a large Irishman, shewn at Oxford some years before, 7 feet 6 inches high; the length of his span being 14 inches; of his cubit 2 feet; of his arm 3 feet 2½ inches; from the shoulder to the crown of the head 11½. The letter of Octob. 11. mentioned one to Dr. BATHURST, dean of Wells, concerning several persons in the family of Mr. SPEKE of White Larkenden troubled with unusual fits, which came upon them all at the same instant, though they were in distant places. Their gestures and actions were the same; if one laugh, sang, cursed, or was any other way passionate, the rest did the same; and the distemper at the same time went off from all. Mr. MUSGRAVE's letter of Octob. 25, took notice, that there had been some discourse in the Philosophical Society at Oxford concerning the effect of bleeding on the eye sight; arguments being brought from experience, that it had both weakened and strengthened the sight in different constitutions.

Dr. PLOT observed on the mention of the large Irishman, that there was kept

\* It does not appear there.

† Letter-book, vol. x. p. 210, 224, 253.

in the library of Brazen-nose college the picture of a person, called the child of Hull, being nine feet three inches high.

It was queried, whether the fits of the persons mentioned in one of Mr. Musgrave's letters lasted long; and whether they were not caused by something, which the persons had eaten.

A letter of Sir RICHARD BULKELEY to Mr. ST. GEORGE ASHE, dated at Old Bawn, July 11, 1685<sup>o</sup>, was read, concerning his newly invented chariot; and he being present at the Society explained more fully several particulars in the said letter.

The most obvious objections against the said chariot being the great noise made by the rollers and the firing of the axle-tree by the swift turning round of the wheels, it was queried, whether petrified wood, being not subject to fire, nor to break but with the grain, as wood does, might not be of use.

Sir RICHARD BULKELEY acquainted the Society, that he had sent for his chariot made after this model, and hoped in a little while to shew it them.

Mr. EVELYN communicated a letter, which the president had desired him to shew to the Society, dated at Portsmouth, Octob. 25, 1685<sup>r</sup>, containing an account of the remarkable effects of a storm of thunder and lightning the day before, happening to two of the King's ships then lying in the harbour of Portsmouth.

Dr. SLARE communicated to the Society, by the direction of Mr. BOYLE, an historical account of a strange self-moving liquor<sup>a</sup>, which Mr. BOYLE had had in his keeping several months, and during that time had carefully observed.

Dr. SLARE was desired to inquire what the ingredients of that liquor were.

Mr. HAAK presented a paper, intitled *Typus Eclipses Solaris, quæ contigit die 2 Julii, p. m. A. D. 1684, ab Observatoribus Jo. Ph. WURTZELBAUX & Ge. CHR. EIMMARTO Noribergæ exhibitus*. Mr. HALLEY said, that he had considered the paper, and found, that by the end of the eclipse at Nuremberg compared with the end of it at London, the difference of meridian between them was 44½ minutes.

Mr. HOUGHTON presented in the name of Mr. GRAHAM a pair of Indostan shoes, an arrow, and some writing upon a palm-leaf.

He likewise shewed two stones, which were conceived to be gypsum, and good chiefly for mortar.

Dr. GALE presented to the Society a large earthen urn, with the bones in it, and an earthen cover upon it, which had formerly been dug up out of a gravel-pit in the north field of Peckham in the parish of Camberwell in Surrey, as appeared

<sup>a</sup> Letter-book, vol. x. p. 105.

<sup>b</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 177.

p. 1112 for December 1685.

<sup>c</sup> Ibid. N<sup>o</sup>. 176. p. 1188.

from a paper signed by several persons, who were present at the finding of this urn and eleven or eight urns more, which were not so intire.

A paper having been communicated by Monsr. JUSTEL, printed at Paris, and intitled *Experience proposée aux Physiciens par \* \* le 8 Octobre 1685*, being a contrivance for a perpetual motion; Dr. PAPIN observed, that the method was not practicable, since the bellows could never be opened, their outside being prest with a weight of twenty seven inches of quicksilver, equal to the atmosphere, and the inside being helpt but with five\*.

Nov. 4, at a meeting of the COUNCIL were present

	Dr. LISTER vice-president,
Sir ANTHONY DEAN	Mr. WALLER
Mr. HILL	Mr. ASTON.

A letter from Dr. WALLIS being read relating to the accounts of his arrears, the council was satisfied therewith, and ordered the arrears to be struck off.

Sir RICHARD BULKELEY was proposed as a candidate and approved.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Among the woods, that sink in water, Sir JOHN HOSKYNs mentioned heart of oak in the forest of Dean.

There were presented to the Society from Monsr. VILLERMONT two books, one concerning the river of the Amazons, and the other the catalogue of the library of Monsr. SEGUIER.

A letter of Mr. LEEWENHOECK, dated July 13, 1685, was read, shewing, that as in the seeds of plants and trees the young plant or tree is contained with all its parts, as leaves, vessels, body, root; so in all animal productions the animalcule contains the figure of the animal; it seeming consonant to nature, that the seed of the body of the thing be contained in a very little room.

There were read four letters of Monsr. JUSTEL to Mr. ASTON<sup>f</sup>, received during the Society's recess, concerning a picture of the French King upon a marble table of twelve feet square and an inch thick, the colours being all sunk into the marble; an incombustible plant, said to be found near the Pyrenees, to make cloth of; Indian partridges, that sometimes eat one another; bitumen brought from Florida; 124 volumes sent from China by Father COUPLET; an exact description of the aquæduct then making in order to carry water to Versailles and Marli<sup>g</sup>; and the change of a girl, who had been baptised as such, into a boy.

<sup>g</sup> Dr. PAPIN's observations are printed in the *Philos. Transact.* N<sup>o</sup>. 177. p. 1240.

<sup>f</sup> Letter-book, vol. x. p. 206, 208, 211.

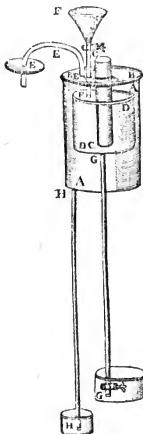
<sup>g</sup> See Printed in *Philos. Transact.* N<sup>o</sup>. 176. p. 1206. for November 1685.

Upon.

Upon occasion of Mr. LEEUWENHOEK's letter, it being discoursed concerning the possibility of changing the nature of things, Sir JOHN LOWTHER said, that barley and big interchange or turn from four rows to two, and two to four, as the ground is better or worse.

Dr. LISTER supposed changes to be accidental, such as colours in tulips and other flowers, and multiplicity of leaves in gilly-flowers; but that one plant did not change into a distinct species.

Dr. PAPIN shewed how he had completed a cleftydra after the manner of Monf. COMIERS. The glass being to run an eighth of an hour, was made to turn on an axis, the jet d'eau coming to it's height without shaking. His account of it was as follows:



" The solution of sugar, that I set to evaporate *in vacuo*, is come to be dry in about four days: but it did not crystallize like sugar-candy: it doth but look like a piece of a sugar-loaf. I can't tell whether it is, because the operation hath been too quick. I have brought it hither, that it may the better be observed what it is.

" I have also prepared the two instruments, whose description I presented in the last meeting, and I have made with them a very successful trial: for as soon as an equal heat was applied to both instruments together, a great quantity of vapours was seen to rise out of the water *in vacuo*; but out of the other there appeared none at all: so that it seems manifest, that *vacuum* may be a great help to hasten evaporation and distillation. I have therefore thought of an *apparatus*, that might be of a great advantage in making salt, copperas, and other wares, that are performed by evaporation.

" AA is a great vessel to receive and condense the vapours.

" BB a cover applied to it.

" CC a large pipe open upwards, and shut downwards, wherein the fire is to be kept.

" DD a vessel to contain the liquor to be evaporated; this is included in the great vessel AA.

" EE a pipe making the communication between the vessel AA and the pneumatic engine, for to exhaust the air out of the said vessel.

" FF a funnel so ordered with a turn-cock, that we may pour new liquor into the vessel DD without letting in new air.

\* Register, vol. vi. p. 250.

I i i 2

" GG

" GG a pipe above thirty three feet high, with a turn-cock, whereby the liquor  
 " may be drawn from the vessel DD when it is much evaporated and ready  
 " to shoot.

" HH another pipe above thirty three foot high, whereby the phlegm condensed  
 " in the vessel AA may continually descend and leave the vessel empty for to  
 " receive and condense new vapours.

" Now it is plain, that the instrument being once exhausted of air through the  
 " pipe EE, a body may keep it at work constantly without any more ado, but to  
 " keep fire in the pipe CC : and through the pipe GG draw the liquor out of the  
 " vessel DD, when it is ready to shoot : and thorough the funnel FF put new  
 " liquor into the vessel DD as often as it is convenient. Such an instrument be-  
 " ing kept constantly at work, would in a year's time save a very great expence  
 " of fire : neither is it so difficult to be made well and good, but I would un-  
 " dertake it at my own peril, if any body hath occasion to use it : mean while if  
 " the Royal Society pleaseth to see the experiment of evaporation *in vacuo*, with  
 " the little instrument, that I have ready made, I will bring it hither for the next  
 " meeting."

Sir RICHARD BULKELEY was proposed a candidate.

Nov. 11, at a meeting of the COUNCIL was present

	Dr. LISTER vice-president,
Mr. HILL	Dr. SLARE
Mr. WALLER	Mr. ASTON.

Dr. LISTER, with the approbation of the council, licensed a book, intitled *Appendix ad Historiam Naturalem piscium Domini WILLUGHBI, &c.*

Mr. ASTON acquainted the council, that the president, SAMUEL PEPYS, Esq; would give the Society fifty pounds to be laid out as the council should judge most convenient.

It was ordered, that the money be laid out to pay for fifty plates in the *History of Fishes*; and that the president's name be put to those fifty plates : and

That the Society be acquainted therewith, that they may all concur in returning their thanks to the president.

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

A committee was chosen out of the fellows of the Society, such as were not of the Society, for the auditing of the treasurer's accounts, being Mr. MEREDITH, Mr. PITFIELD, Mr. PERRY, Mr. HOUGHTON, and Mr. LODWICK.

Dr.

Dr. LISTER having acquainted the Society, that the president had sent word by Mr. ASTON, that he gave them fifty pounds to be laid out as the council should direct, Mr. EVELYN, Dr. LISTER, and Dr. GALE were desired to wait upon the president with the thanks of the Society.

Dr. SLOANE's observations concerning the sweet smelling water found the last summer at Hoxton near London, was read, and ordered to be registered<sup>a</sup>.

There were communicated by Mr. MUSGRAVE a letter given him by Dr. BATHURST, and an extract of a letter from Dr. OVER; the first being from Dr. DERHAM of Wargrave near Henley concerning a child, who died at a year and half old, and whom he had opened, and found the pericardium filled with a purulent matter of a greyish colour inclining to yellow, about the quantity of a quart, very sour, and a polypus running from the right auricle through the cava into the subclavians, and one or both of the jugulars. The second letter contained two strange cases of the small pox; viz. of a child born full of the small pox, and dying of them, the mother being free of them for six years past; and of a woman dying of the small pox after sixteen days, her child half a year old, who lay with her, and sucked her, not being infected.

Dr. LISTER remarked, that the disease was a dropsy about the heart, but that he did not take the liquor to be acid, but alkalizate, as other things within the habit of the body usually are.

Dr. SLARE said, that he had made several experiments proving the liquors in the body not to be acid.

An experiment having been tried by Mr. BOYLE with a convenient apparatus, proving, that water included in a slender pipe would press upon a large basis as much as a pillar of water as large as the basis, and as high as the slender pipe; he appointed Dr. PAPIN to shew the same to the Society; which was done, and the same experiment was ordered to be repeated at the next meeting.

Nov. 18. An account of some experiments made with the *saliva humana* by Dr. SLARE, and mentioned at the last meeting, was read, and ordered to be registered<sup>b</sup>, as follows:

" By reason of the small quantity of spittle, that can be collected otherwise, I was forced to make use of the spittle of a gentlewoman put upon a salivation, whose case was not venereal but scrophulous.

" After she had used three drams of mercurius dulcis, the salivation was carried on very successfully. I could not find, that a piece of gold kept some

<sup>a</sup> Register, vol. vi. p. 265. It is printed in Mr. RAY's *Philos. Letters*, p. 192.

<sup>b</sup> Register, vol. vi. p. 263.

" hours,

“ hours in her mouth would attract any quicksilver unto it, as some do venture to relate as a common experiment. Nor did I find, that either fine gold, or silver, or tin, after it had been lodged a whole night in a quart at least of the saliva, did alter its colour the next day, so that nothing did offer to amalgam with them.

“ The spittle itself, when it was poured into the basin, did seem to rise up in bubbles, and to have some fermenting intestine motion; but this lasted not long after it was discharged the body.

“ I attempted to make it ferment with alcalies, to find out the subacid menstruum, SYLVIVS and others have declared it to be; but the volatile salts of armoniac, and those of hartshorn, as also the fixed salts of wormwood, oleum tartari per deliquium, would not produce any fermentation or motion at all.

“ Moreover, having tried all the four spirits, such as of nitre and spirit of salt, with oil of vitriol, and the more mild acids of lemons and vinegar, I could not produce any ebullition, or the least commotion of the liquor.

“ This put me upon a farther examen of the saliva by committing it to distillation in a very moderate warmth of the sand.

“ I conveyed a gallon of it into a large retort, and examined the liquor as it distilled over: the first quart was quite insipid water; so was the second; the third quart began to ferment a little with a strong oil of vitriol, but regarded not the other acids of spirit of salt or spirit of nitre.

“ The last, that came over, was about twelve ounces: this seemed to have some salt in it by the yellow colour, but yet was not of a piquant urinous smell; it did a little more ferment with oil of vitriol than the former.

“ In the bottom of the glass, I found a greyish salt, which is not truly volatile, nor yet a lixivate fixt salt, much less like a marine salt; for it shews itself to be a true alcali, by its very ready fermenting with any acid.

“ Note, that through this whole operation there was nothing, that in the least favoured of acidity, which might have been expected to ensue upon distillation, if there had been any salts contained in the saliva with any disposition to acidity. For we find the bitter or insipid juices of wood upon distillation to degenerate into acid liquors.”

A book was presented from Mr. BOYLE, intitled, *Of the Reconcilableness of the specific Medicines to the corpuscular Philosophy: to which is annexed a Discourse about the advantages of the use of simple Medicines.*

A letter of Mr. VINCENT was read, desiring a correspondence with the secretary

tary about philosophical matters; and the secretary was ordered to write to him.

Mr. HOUGHTON mentioning, that the price of corn had been observed for twenty years at Oxford and Cambridge, he was desired to procure an account at London, his expenses not exceeding five shillings.

A copy of the minutes of the Society at Dublin from the 6th of July to the 10th of August was read, as follows\* :

" I am ashamed I can make no better a return for your very acceptable communications : our company of late has been very thin, and people's heads so much diverted with politics, that next meeting, I believe, we shall adjourn till the term : however, if any thing worth acquainting you with, happen, in the mean time, I will not fail to give you a punctual account thereof.

" I am just now informed of a girl, who has several horns in many parts of her body : of this you shall have an account by the next.

" July 6, 1685. Mr. TOLET brought in a proposition in gunnery, sent from Mr. EDMUND HALLEY, with its construction and rule, but without a demonstration. He shewed the construction to hold true in all cases, but deduced another rule from thence.

" A letter from the right reverend the Lord Bishop of Leghlin, dated June the 19th, was read, containing several curious observations, which his Lordship has made concerning insects. Two things he would yet have farther inquired into in their history, 1st, how to rank them according to their follicles, which some weave of thread, others (the hairy ones) make of hair, others of earth, crumbs of leaves, wood, moss, &c. and some make none at all, but suspend themselves against a tree or wall by a single thread drawn across their bodies, and fastened at both ends to the wall. 2dly How to range them according to their chrysalises, or aurelias ; both which he conceives would conduce as much to the well understanding their natures, as the knowledge of plants by their seeds and feeds (or the seeds and their cases or covers) and of birds by their nests and eggs (the former of which do much discover their sagacity and many other properties) can conduce to the right understanding of theirs ; the folliculi of insects being answerable to the nests of birds, or to the seeds or seed-cases in plants ; and their chrysalises corresponding to the eggs of those and to the seeds of these, whence immediately do spring the living creatures. The thanks of the Society ordered to be returned for this letter.

" The remaining part of Dr. WALLIS's very rational ingenious discourse concerning weather was read, and our thanks ordered to be returned.

\* Letter-book, vol. x. p. 242.

“ A letter from Mr. MUSGRAVE, dated June the 21st, containing the minutes of the Oxford Society, from May the 26th to June the 16th, was read.  
 “ Several of the members promised to enquire diligently, whether such shells as that, which contains the purple-fish, be found on our shores: the thanks of the Society ordered to be returned Mr. MUSGRAVE for his present, and that it be carefully laid up in our repository.

“ An account of the wind, weather, height of the mercury, &c. for the month of June brought in by Mr. ASHE.

“ A letter from Sir RICHARD BULKELEY, with a description and trial of the new calash, mentioned by Mr. CLINET, was read.

“ July 13, We adjourned our meeting, because of the philological act at the college.

“ July 20. A letter from Mr. MUSGRAVE containing Dr. PLOT's desiderata in chemistry was read, and committed to Dr. SYLVIVS and Dr. MULLEN, who from some hints therein proposed to make a few experiments, and to give the Society their thoughts: they also mentioned some farther arcana to be added to this catalogue.

“ Dr. MULLEN shewed the following experiments before the Society. An equal quantity of river-water mixed with spirit of wine caused a great many bubbles, which lasted long, was but milk warm, and pellucid. Pump-water with spirit of wine made greater fermentation; the bubbles soon disappeared; 'twas warmer than the first, and turned wheyish. Rain-water with spirit of wine caused a fermentation and heat like the first, with no alteration of colour: the like also happened in plantain water poured into spirit of wine, but spirit of wine poured into the distilled water produced a greater fermentation. Sublimate sulphuris per campanam mixed with spirit of wine fermented more slowly, but became blood-warm, that is, much warmer than the rest. Syrup of violets with spirit of wine made small fermentation, with a few bubbles: it turned of a greenish colour. Cornu cervi ultum upon syrup of violets turned green, upon which sublimate sulphuris per campanam poured changed it to red, with a very great fermentation. Milk dropped into spirit of wine presently coagulated.

“ July 27. A discourse of Mr. RAY's concerning the macreus or scoter, and also one of Dr. TANCRED ROBINSON on the same subject, and concerning boiling and other fountains communicated by Mr. MUSGRAVE, were read, and our thanks ordered to be returned. They gave occasion to Mr. AETON to discourse of somewhat relating to them, mentioned in old authors; and of the account STRABO gives of the lake Avernus, which mentions the reason, why, even in his time, it had lost its infectious mortal effluvia. The description likewise of this bird was read out of Mr. WILLOUGHBY's *Ornithology*, which agrees indifferently to a sea-fowl frequently taken near the island called Ireland's Eye.

“ A large

" A large piece of Lough Neagh stone found on the shore was given to Mr. SMYTH, having the exact grain of wood, and the mark of cutting.

" *August 3.* An account of the wind, weather, hight of the mercury, &c. is brought in by Mr. ASHE. What Dr. GARDEN affirms, that when the wind turns to north, N. E. or N. W. the mercury always rises, was not found true.

" A letter from Mr. MUSGRAVE, dated July the 16th, was read, containing the draught of the incombustible cloth, and the figure and description of an Indian honey-comb, which several affirm to be so like that of our common humble bee, its honey likewise being much more limpid than that of other bees, and its lodgings in trees and other cavities, that it may well deserve farther inquiry.

" An extract also of a letter from Mr. LEIGH of Lancashire was communicated, which gave account of a buck found intirely whole and uncorrupted under ground: Query, whether the hoofs as well as horns were soft, and grew hard when expoled to air? Of a calf whose skin was inverted: query, whether 'twas brought forth alive, and whether the skin hung loose and was fastened, the hairy part to the fleshy pannicle? Of peats which burn so violently as to melt down gold: query, of what sort of earth they are made? because somewhat like this was affirmed of a kind of Irish turf. Of a wound; out of which there came daily a piece of fat as big as a nut, which was friable and would blaze in the fire. A piece of black stone full of shining particles and of a sulphureous smell was presented, taken out of a quarry near Maryborough in the Queen's county. Dr. MULLEN was desired to examine it.

" Ten pieces of old British coin, found in the middle of a rock, were shewn by Mr. ASHE.

" *August 10.* A letter from Mr. MUSGRAVE was read, containing a very odd and remarkable relation of one, who for many years has had constant obstinate convulsions every Sunday, by Dr. COLE of Worcester. Another letter also from Mr. MUSGRAVE, communicating a like relation by the same doctor, of periodical convulsive motions returning every 5th day, which the doctor cured. The thanks of the Society ordered to be returned for these considerable communications.

" Dr. MULLEN gave a relation of a gentlewoman, a patient of his, who had four cold fits of an ague, and as many hot ones every twenty four hours. The fits came so thick on one another, that there were but very small intermissions, for presently after she cooled out of her hot fit, she fell into a cold one. Thus she was for four or five days before he was sent for; but in two days she recovered by a method he uses for cure of that distemper.

" He also acquainted the Society, that he ordered a quantity of scurvy-grafts to be bruised in a stone mortar, and to be put up in a convenient vessel; which, having first poured enough of strong brandy on it to cover it, he closed very  
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“ well and so kept it for a month, and then distilled it in a limbeck, and got a good quantity of a very pungent spirit, much insipid phlegm, and last of all an oil as insipid as faller oil, which he was surprized at, having expected the most pungent acrimonious oil, that he knew any vegetable to yield, when he saw, that the scurvy-grafs yielded any. But having repeated the experiment (though the fermentation or maceration was continued but for four or five days) he had reason to think, that there were two oils in it, one a very pungent piercing one, and the other wholly insipid: for he separated a small quantity of the former along with the spit t, and the latter he separated along with the insipid phlegm. He is therefore induced to believe, that the volatile ætheral piperine oil in the first parcel of scurvy-grafs was changed into a spirit, there being neither oil nor milkyness to be seen in what came over the helm, finding that in the latter parcel both was to be found, and over and above some of the pungent oil.”

The secretary was desired to procure a copy of Dr. PLOT's *Desiderata* in chemistry.

There being presented some observations of Dr. WALLIS upon a book of Mr. RICHARD NORRIS concerning his manner of finding the true sum of the infinite fecants of an arch of an infinite series\*, the papers were put into Mr. HOOKE's hands to read over, and make a report of them at the next meeting.

The experiment made at the last meeting by Dr. PAPIN was again tried; viz. that a vessel of water being broader at the bottom than the top, weighs equal to a cylinder of water as broad as the bottom of the vessel, and as high as the perpendicular from the surface of the water to the bottom.

Dr. PAPIN shewed likewise a way of keeping the juices of fruits and other parts of vegetables without any addition. The juice of cherries being shut up *in vacuo* in two glasses three quarters full upon the 26th of June, in a day's time the liquor was clear, and the sediment fell to the bottom: in four days time both bred air. One glass was sufficient to ferment, but was still close, except when the air broke out. The other was boiled a quarrer of an hour in *balneo Mariæ*, and from that time neither bred air nor fermented. This liquor was very generous and well tasted, having the relish of the fruit; but the other, that fermented, was poor and something sharp.

Nov. 25. Sir RICHARD BULKELEY was elected and admitted.

It being discoursed concerning the standard foot of Paris and several other places, compared with the English foot; Mr. HALLEY was desired to give directions for the making a measure in metal to be kept in the repository, containing, together with the English, the Paris, Roman, and other feet most in use.

\* Dr. WALLIS's observations are printed in the *Philos. Transact.* N°. 176. p. 1193.

A paper was communicated by Mr. ARTHUR BAILEY, being observations, which he had directed to be made by a master of a ship, that was to pass the æquinoctial line, in order to the knowing the place, where the direction of the south pole prevails above the north<sup>a</sup>.

It was wished, that the master of the ship had continued his observations, when he was to cross the line the second time after he was past the Cape of Good Hope.

A paper was communicated by Mr. HAAK from Mr. ARNOLD of Nuremberg, being an account of the declination of the magnetic needles lately observed by EIMART, &c. in order to the ascertaining its variations<sup>b</sup>. But it was judged, that the needle was in the same position, in which it had been observed five years before.

The two last papers were delivered to Mr. HALLEY, to consider of against the next meeting.

The Society desired, that Mr. HALLEY, Mr. HOOKE, Mr. HAYNES, Mr. PAGET, and Mr. FLAMSTEAD, as likewise Dr. WALLIS and Mr. CASWELL at Oxford, would severally observe the declination of the needle about the winter solstice now approaching; and that each of them would give in their account in writing.

A letter from Dr. VINCENT, dated at Clare-hall Cambridge, November 23, 1685<sup>c</sup>, was read, mentioning an invention, which he had, he thought, brought very near its utmost perfection, of that universal benefit, that it would be serviceable and very desirable to all mankind, except those, who cannot write and read, and as easy and cheap as valuable. This he offered to discover, if he could have subscriptions for it as for a book. To which it was answered, that the Society could not proceed in his way, till they knew the matter.

Two letters in Latin were read, one to the Society, the other to Mr. ASTON<sup>d</sup>, the latter dated at Dantzick in August 1685, and signed S. A. Von L. presenting some copies of the three *Litteræ buccinatoriæ ad universos in Hermeticis curiosos direllæ*; challenging the Hermetic philosophers to give some proof of their secret art, or else they should be written against and discovered to be cheats; together with some copies of a book in answer to Monf. SCHROTER's instruction about the making of gold.

The letter to the Society seemed to demand two things: 1. Whether they were against publishing the book, with which the Hermetics were threatened. 2. Whether they were indifferent in it, and would acquiesce in the doing it, which he desired to know.

<sup>a</sup> Printed in the *Philos. Transact.* N°. 177. p. 1213. for December 1685.

<sup>b</sup> *Ibid.* N°. 178. p. 1233.

<sup>c</sup> Letter-book, vol. x. p. 257.

<sup>d</sup> *Ibid.* p. 267, 268.

A copy of the books was given to Dr. SLARE to peruse and report the contents of them; another copy being designed for Mr. HENSHAW, and a third for Mr. BOYLE, if the latter had them not already.

An account of several experiments made by Dr. SLARE, to shew the insufficiency of alcalis and acids to discriminate the *res medica*, was read, as follows<sup>f</sup>:

“ In order to our inquiry into materia medica, or into those simples, that are used in medicine, it seems necessary to search after such proper and adapted instruments, as may best serve such purposes. It’s well known, that some would make up all bodies of the four elements, and reduce them to those four; others are for three, others five chemical principles; but there is scarce so much need as of mentioning these groundless hypotheses, since the great patron of true philosophy, Mr. BOYLE, has shewn the imperfection of those principles, and taught us to build on better foundations. Amongst other hypotheses, that of acidum and alkali has obtained very much repute, inasmuch that on these two pillars some professors of physic have raised great superstructures, even systems of physic; and others do steer the whole course of their practice by the conduct of this hypothesis. Mr. BOYLE has in an excellent treatise on this subject, made it very plain, that all phenomena in nature cannot possibly be explained and accounted for by the mentioned hypothesis; so that he justly reprehends the latitude given by the teachers of this doctrine, but withal allows it to be of very great use in chemical and physical matters. Of how great use and importance this hypothesis may be, it will not be amiss to enquire and determine; for if by this way the causes and effects of all or most phenomena may be stated and discovered, the method is so easy and compendious, that it would be very happy we were secure of the truth of it: but if there be much fallacy or uncertainty in this notion of acid and alkali, then it were better removed out of our way, or else circumscribed within its proper bounds.

“ That there are such substances in rerum natura as acids, it is undoubtedly true and obvious.

“ There are also natural acida and artificial.

“ There are also salts, that are called alkalis, and these properly and improperly so.

“ By alkali is properly meant a fixt salt: and here may be ranged all sorts of vegetable fixt salts, whether of the herba kali or pot-ash, salt of wormwood and of other vegetables, for the fixt salts of animals are rarely met with.

“ By alkali improperly so called are meant the volatile salts of vegetables or animals; or, yet more improperly, if not impertinently, all testaceous bodies, and in the greatest latitude of all, any thing, that ferments with an acid.

<sup>f</sup> Register, vol. vi. p. 268.

“ The

" The better to accommodate this discourse to the present meeting, I will not make it tedious, but lay down two or three propositions, and prove them by experiments; and then infer a corollary or two.

" 1. That there are few bodies in their natural state have so much of alcali salt in them, whether fixt or volatile, as will produce a fermentation or conflict with an acid.

" 2. That many, the greatest number perhaps of those experiments, that are made to prove this hypothesis, are upon a mistake; and that in reference to the common materials they use.

" 3. There are many substances, that have very great proportions of alcali salts in them, where acids not in the least regard them, so as to make any conflict with them.

" 4. There are bodies, that abound very much with acids and alcalis both, and that in unequal proportions, and yet are not at all to be discovered by any commotion or fermentation producible either with the alkali or acid.

" To the first proposition, that there are much fewer bodies than one would expect; or easily believe, endowed with this presumed alcali, so confidently reported to be an ingredient in all bodies, so necessary for the projected acid to make a conflict or luctation with. For the proving this position, I will fetch my experiments from salts themselves divested from any other heterogeneous mixture, that might hinder the free operation of the acidum upon them. Moreover these experiments shall be made on the most catholic salts, that run in the veins of the macrocosm and microcosm, as chemists love to call the earth, and the human body. Namely, vitriol, alum, common salts, salt petre, and sal calcarius described first by the very learned Dr. LISTER: as also spittle, blood, serum sanguinis, and urine.

" 1. We made a strong solution of green vitriol, and poured thereon first spirit of vinegar, and then I tried the same solution successively with other acids, using spirit of salt, and even spirit of nitre itself; but there followed no luctation or contest, or any incalcescence: Yet considering with myself what potential acid was concealed in this substance, from whence oil of vitriol comes, I mixed with a strong solution of this vitriol spirit of sal armoniac, which is a high alcali, upon which also no conflict or motion ensued.

" 2. Having made a strong lixivium of alum by dissolving it in water, I first mixed with one part of this solution common vinegar, and then I mixed with another part spirit of Venus or of verdigrease, and so proceeded to spirit of salts, and of nitre; but could not with any of these discern either any conflict or heat to succeed the mixture. I also made the like experiment with the volatile spirit of hartshorn, and with a strong solution of salt of tartar, called oil of tartar, both high alcalis: but without the least emerging ebullition or motion of the liquors; only they thickened one another by an union of their salts.

" 3. I then made experiments with sea-salt, whose empire is as vast as the ocean; nor could we here with any of our acids produce any fermentation, nor at all with the named alcalis. I must set a mark upon oil of vitriol, that  
" being

“ being a very unfit test to examine bodies withal, for it works many times so promiscuously on acids and alcalies, and spares scarce any thing, whether animals, vegetables, minerals, or metals: For though our natural acids, and also other highly corrosive acids, pass by this solution without any contest, yet this does hills and heat and boil upon the first contact with common salt.

“ 4. Nitre, an universal salt, as boundless as the air, gave us no manner of observations, but only this, that neither in substance nor solution it made any fluctuation, conflict, or any sort of action, with either our high acids or alcalis: nor did oil of vitriol itself make here any stir or effervescence.

“ 5. I made a very strong solution of Dr. LISTER's sal calcarious, and poured into several distinct glasses, (set in order for that purpose) a certain proportion of this dissolved salt, for I find, that a little water takes up a great quantity of it. My method is to begin with the vinegar, and then with spirit of vinegar; then with spirit of Venus, which I take to be vegetable acids; I afterwards proceed to spirit of salt, of nitre, and sometimes oil of vitriol, that are mineral acids. I could not produce any ebullition upon the application and mixing of these acids in any proportions: with alcalies there was no expectation of any fluctu, in which I was not disappointed.

“ The human body abounding with salts, and the humours being most of them actually salt to the taste, I made some experiments, of which I shall not give the minutes, but only the success for brevity sake.

“ The blood I put on the trial was warm, and not yet separated. The urine was also warm and very lixiviate to the taste; but neither of these made the least stir or conflict with any of the named acids, even the fierce oil of vitriol itself. The serum sanguinis being cold did the same thing with the rest. With the saliva I made my experiments with various sorts of alcalis, by reason of the notion of its being an acid: but experiments, that have been offered at the board of the Royal Society, and others yet to be tried, will clear it from having acidity; though it be yet farther than any of the former juices of the human body from any possibility of fermenting with an acid. So much for the first proposition.

#### “ The second proposition.

“ 2. That perhaps the greatest number of experiments to prove this hypothesis, have been erroneous and mistaken. No bodies have been more firmly relied on to prove the inherent alcalis than those that are testaceous substances, as oculi cancri, the shells of fishes, pearl, and other hard substances of fishes; whereas these and many other fixt alcalis (as they are called) have little, if any salt at all in them: so in like manner stones, and chalk especially, by reason of their easy fermentation with an acid, are certainly determined to abound with fixt alkali salts. The common error about chalk I dare not pass by without examining, and the rather because this is so constantly asserted to have much salt in it, inasmuch that GLAUBER (according to his way) conceals a process how to get four or five ounces of nitre out of chalk: but for my part, after  
“ several

“ several careful examinations, I could yet never procure any sort of salt out of chalk.

“ We took a pound of chalk and beat it to powder, and then boiled it in water for many hours, after this filtered it, and evaporated the water; but found no salt in it, more than common water contains.

“ We then put a pound of chalk in a strong reverberatory, where it lay above fifty hours in that mighty heat: while it was yet warm, I conveyed it into a quantity of fair water, and made the water boil upon it to extract any contained salt; but upon the evaporation of this water, I found no more salt in this than in the former experiment. The remaining calx did very easily ferment with the mildest acids. I could enumerate an abundance of instances, both in the animal and mineral kingdom, where for the most part there is no salt at all to be found, or if any, after that is removed, the fermentation with an acid is very strong and violent: but these instances will be referrible to other positions alio.

“ The third proposition, that there are many natural substances, that have much alkali in them, where yet the acids will not produce any ferment; here I might instance in tartar, which abounds so plentifully with alkali, that scarce any body has more, and yet is not at all concerned when mixt with an acid; but on the quite contrary, if you mix an alkali with it, the luctation will soon begin. However, if we separate one from the other, we may find only a very mild acidity, and in very small proportion compared with the great quantity of the alkali salt, so little regarded or detected by this way of experimenting, there being so few natural bodies stocked with this alkali salt, as the first proposition complains of, that I must borrow some instances from more artificial bodies; and here sal armoniac will be a very plain and notable one; for in this we can make it appear, that there are above eight ounces in a pound of the highest volatile alkali, from whence might be expected the greatest ebullition; but upon the trial we found, that it regarded not the vegetable acids, nor would it ferment, or make any commotion with spirit of nitre, but silently dissolved in it, as it would have done in water. Nitre is no wise inferior to tartar, for it yields above half of a true fixt alkali salt, but yet makes no luctation with any acid: see the fourth catholic salt above named.

“ The fourth proposition.

“ 4. That some bodies have both acids and alcalis in unequal proportions, that yet will not fight, either when attempted with an acidum or alkali. I need only call upon the two last named salts for a proof of this proposition, sal armoniac and nitre, these containing both strong acids upon certain ways of distillation, both which, as above said, make no collision with acids and not at all with alkalies. This way of proceeding with acids and alkalies, by projecting the one or the other of various vegetables, gives but little satisfaction. As to the alkali, I could never find it discover any of those four juices, we observe all sorts

“ of phytic. Not excluding any other expedient for the better trying the nature  
 “ and constitution of what the faculty call simples, I will begin with distillation :  
 “ and first of all with succinum, one of the most useful drugs belonging to the  
 “ materia medica. For the future I intend to examine bodies, first in composito,  
 “ and then in analysi. I have some few experiments on succinum itself in concreto ;  
 “ which I beg leave to postpone to the next meeting, and now to begin with the  
 “ volatile salt of succinum.

“ This volatile salt I have some ways to prove it a volatile salt sui generis, (if I  
 “ may be allowed to call it volatile) for it differs from all other volatile salts of  
 “ vegetable and animal bodies. But before I come to that, I think I must ex-  
 “ clude it from being truly a volatile salt. For here I would lay down the true  
 “ standard of volatile salts, viz. that those salts, which, upon distillation either in  
 “ their own phlegm or in common water, do ascend or rise out of this water,  
 “ leaving the water behind, I find these to be volatile salts ; or that all volatile  
 “ salts, vegetable and animal, are lighter and sooner elevated by heat than water.  
 “ To return to our salt of amber, I always found, that common water would quite  
 “ evaporate and leave our salt dry at the bottom : yet upon a stronger degree of  
 “ fire, the salt of amber would rise up to a great height. So that it is called a  
 “ volatile salt, yet improperly so, because it does not come to the standard of  
 “ volatility, which is to be more volatile than water. As to the nature of this  
 “ volatile salt, there are some properties of it, that plainly prove it an acid, or ra-  
 “ ther subacid : by touching a solution of it with a knife it corroded the metal, and  
 “ left a stain, as the juice of lemons does. Take equal parts of this salt, and of  
 “ salt of amber, and rub them in a mortar, and then dissolve them thus mixt in  
 “ common water, and they produce the usual conflict, that real acids and alcalis  
 “ are owned to do. The hon. Mr. Boyle has taught us a most excellent and  
 “ pleasant experiment, far beyond that of lustration, to examine acids and alcalis  
 “ with, namely, by the tincture of lignum nephriticum, which has two very  
 “ manifest colours, viz. a blue and an orange-colour : the acid always destroys  
 “ the blue, and leaves in it one uniform orange-colour : with one drop of ordinary  
 “ spirit of salt, I have destroyed the colour of an ounce of this blue tincture. I  
 “ poured some of this dissolved salt of amber into the mentioned tincture, and it  
 “ took off the blue, and left it, as spirit of salt had done before. We also made  
 “ a solution of this salt in water, and then by putting filings of iron into the solu-  
 “ tion, let it stand some hours in a cold place, that it might work upon the me-  
 “ tal, which it did without much ebullition, as it appeared by mixing it with a  
 “ solution of galls, for it turned to a deep ink. I farther observed by a gentle  
 “ sublimation of this volatile salt by a lamp furnace, that the figure of it was apt  
 “ to rise, and settle itself in long cylinders, which to the eye seem to run up to a  
 “ pyramid : but by a microscope they seem to me plainly to be a great many  
 “ round cylinders, that did settle one a top of the other, like several shoots or  
 “ branches a little unequally set together, somewhat like to knot-grafs. I pre-  
 “ served some of these salts in the bottom of my glafs, as they were just ready to  
 “ take flight, and volatilize, and found several of the little ones, just like one  
 “ branch of the many, that seem to go to the making up of one of our volatile  
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“ pikes, or crystals, if I may so call it, for it looks somewhat like crystal in the microscope.

“ I also endeavoured to shoot them by dissolving these salts in water, and then by evaporating some of the water, that so the salts might subside, and shew their figures; and I found them all incline to run into long and cylindrical figures, as the salts being at hand do demonstrate. Dr. PAPIN upon my request evaporated some of the water, my salts of amber was dissolved in, in his vacuo, which hereupon shot into a crystal, bearing the figure of a cross, which seems also to be made up of those cylinders beforementioned.

“ I was willing to be the more particular in describing this salt, because I have met with several physicians of my acquaintance, who have been unwilling to believe it differing from other volatile salts; and therefore have very often joined them together in the same composition, which I know they would scarce have done, had they ever made the former experiment, namely, that of mixing the volatile salt of armoniac with that of amber, and then dissolving both together in water: for had they seen how disagreeing salts they are, it would certainly have made them consider, whether they would not have fermented, and quarrelled much more in the warm stomach (which is seldom without lymph enough to dissolve them) than in the cold air, and by this means the truly volatile salt would, no doubt, have left its texture, its motion, and volatility: for this is the effect of all acids, they are apt to clip the wings of all volatile salts, insomuch, that it requires much art and trouble to reduce them to their former state of volatility.

“ Moreover, those, that derive all diseases from acids, especially spasms, whether epileptic or other convulsive motions, will now calmly consider, whether they have done well in giving this medicine in that quantity as they have done: for surely they considered it a volatile alcali, and like salt of man's skull, of hartshorn, &c. and far from being its antagonist. The reason of this mistake I judge to proceed from hence. Succinum is in itself a sort of a reputed alcali, and used in substance against epileptic or convulsive diseases, and not without reason. The oil of succinum is also known, both as to the smell and internal operations, to help in those disaffections; from whence the chemist argues the volatile salt, which is generally the most penetrating and most vigorous and essential part of the body, must needs be more powerful in its operation, than plain amber, which is very often true, but not always to be relied on: for I could give many instances, where bodies, in their natural state, have properties quite foreign, if not opposite, to what they have in the state of analysis, or in their chemical principles. I will at present instance only in brimstone, which is a mild soft body, and agreeable to what the acidists would call an alcali; yet we know, that one of the most corrosive menstrua is distilled from it upon accension. These two are pretty parallel, for even here the chemical error has perhaps done much mischief; this very corrosive menstruum has been given for an excellent pectoral medicine in cases of the lungs, upon the account that

" it came from sulphur, whose concrete may pertinently enough be used in those  
" cases.

" I have made a digression, which is the more excusable, for as much as it  
" relates to the *materia medica*, and consequently the health of man, and so is not  
" very far from our purpose. In the next place I design to examine succinum as  
" it is a concrete, and also in its oil, in its balsam, the fixt salt, and the caput  
" mortuum, and will give the proportions of each : and will see to what spirits of  
" natural bodies it relates, whether gums or bitumens."

Some of the volatile salt sublimed, being viewed in a microscope, appeared like  
crystal cylinders.

Mr. WALLER was desired to design the figure of the salt, as it appeared in the  
microscope.

The farther consideration of Dr. SLARE's paper was referred to the next meeting.

Nov. 30, being the day of the anniversary election of the officers of the Society  
for the ensuing year, the president took the chair, at the time when thirty seven fel-  
lows were present, though the number was afterwards much increased. The scruti-  
nators chosen were Dr. GALE and Mr. WALLER. The eleven members continued  
of the council were

Mr. ASTON  
Mr. COLWALL  
Mr. EVELYN  
Mr. HENSHAW  
Mr. HILL  
Sir JOHN HOSKYNs

Dr. LISTER  
Mr. PEPYS  
Sir CYRIL WYCHE  
Sir JOSEPH WILLIAMSON  
Sir CHRISTOPHER WREN.

The ten members elected into the council were

Sir RICHARD BULKLEY  
Mr. FLAMSTEAD  
Dr. GALE  
Mr. HAYNES  
Mr. HERBERT

Mr. MEREDITH  
Mr. PERRY  
Dr. TANCRED ROBINSON  
Dr. TYSON  
Lord Vaughan.

SAMUEL PEPYS, Esq; was continued president :

Mr. HILL treasurer :

Mr. ASTON one of the secretaries,

And Dr. TANCRED ROBINSON chosen the other secretary.

Then the following persons, The Lord Vaughan, Sir RICHARD BULKELEY,  
Mr. FLAMSTEAD, Dr. GALE, Mr. HAYNES, Mr. HERBERT, Mr. MEREDITH,  
Mr. PERRY, Dr. ROBINSON, and Dr. TYSON, took the oath of office.

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A tide.

A tide-table for the year 1686, composed by Mr. FLAMSTEAD, was licensed; and the *imprimatur* signed by the president.

Dr. GALE presented from Dr. CUMBERLAND a book, intitled *An Essay towards the Recovery of the Jewish Measures and Weights*.

There were exposed on the table all the figures of the *History of Fishes*, ordered and completed by the great care of Dr. LISTER, together with sixty sheets of the history.

Then were viewed the register of all the experiments made the last year, the journal of the meetings, and the entry of the letters.

Soon after the last anniversary election, the Society lost by death one of its most considerable members,

JOHN PELL, D. D. who was descended of an antient family in Lincolnshire. His grandfather and father, who were both of his name, lived at Southwyke in Suffex, the latter being minister of that place, and dying when he was but five or six years old; and his mother was of the family of the HOLLANDS in Kent. He was born at Southwyke, March 1, 1610, and educated in grammar learning at the free-school, then newly founded, at Stenning, a Market-town in Suffex, under Mr. JOHN JEFFERIES. At the age of thirteen he was sent to Trinity-college in Cambridge, being then as good a scholar as most masters of arts in that university; but though he was eminently skilled in the Greek and Hebrew languages, he never offered himself a candidate at the election of scholars or fellows of his college. His person was handsome, and the habit of his body strong; and therefore scarce ever using recreations, he prosecuted his studies with the more application and intenseness. In 1628 he drew up *The Description and Use of the Quadrant*; written for the Use of a Friend in two Books<sup>a</sup>; the original manuscript of which is still extant among his papers in the Royal Society; and the same year he held a correspondence with Mr. HENRY BRIGGS on logarithms<sup>b</sup>. In 1630 he wrote *Modus supplicandi Ephemerides astronomicas (quantum ad motum solis attinet) paradigmate ad annum 1630 accommodato*; and *A Key to unlock the Meaning of JOANNIS TRITHEMIUS*, in his discourse of steganography; which key Mr. PELL the same year imparted to Mr. SAMUEL HARTLIB and Mr. JACOB HOMEDÆ. In the same year, 1630, he took the degree of master of arts at Cambridge<sup>c</sup>; and the year following was incorporated in the university of Oxford<sup>d</sup>, and on the 7th of June wrote a letter to Mr. EDMUND WINGATE on logarithms; and on the 5th of October, 1631, wrote *Commentationes in Cosmographiam Alstedii*. July 3, 1632, he married ITHAMARIA<sup>e</sup>, second daughter of Mr. HENRY REGINOLLES of London, by whom he had four sons and four daughters. March 6, 1634, he finished his *Astronomical Hi-*

<sup>a</sup> Wood, Fasti Oxon. vol. i. col. 253. and General Dictionary, article PELL (JOHN) vol. viii. p. 250.

<sup>b</sup> The preface to it is dated May 10, 1628.

<sup>c</sup> There is extant a letter to him of Mr. BRIGGS

on that subject, dated at Merton-college Oct. 25, 1628.

<sup>d</sup> General Dictionary, *ubi supra*.

<sup>e</sup> Wood, *ubi supra*.

<sup>f</sup> She is sometimes written ITHAMAR.

<sup>g</sup> General Dictionary, *ubi supra*.

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*story of Observations of heavenly Motions and Appearances*; and on the 10th of April following his *Ecliptici Prognosta: or the Eclipse-Prognosticator*; or *Foreknowledge of the Eclipses*; teaching how by Calculation to foreknow and foretell all sorts of Eclipses of the heavenly Lights. In 1634 he translated *The everlasting Tables of heavenly Motions grounded upon the Observations of all Times, and agreeing with them all, composed by PHILIP LANSBERG of Ghent in Flanders, and set forth by himself in Latin in the Year of his Age seventy one, and in the Year of our Lord 1632*: Now turned out of Latin into English, and from the sexaginal to the decimal Subdivision for the more Ease in Calculation: And on the 12th of June the same year he committed to writing *The Manner of deducing his Astronomical Tables out of the Tables and Axioms of PHILIP LANSBERG*. March 9, 1637, he wrote a letter of remarks on Mr. GELLIBRAND's *Discourse mathematical on the Variation of the Magnetic Needle*; and on 3d of June following another on the same subject.

His eminence in mathematical knowledge was now so great, that he was thought worthy of a professor's chair in that science; and upon the vacancy of one at Amsterdam in 1639 by the death of HORTENSIVS, Sir WILLIAM BOSWELL, the English resident with the states general, made use of his interest, that he might succeed in the professorship of mathematics\*; which was not filled up till above four years after, in December, 1643, when Mr. PELL was chosen to it†. The year following he published, in two pages in quarto, a refutation of LONGOMONTANUS's discourse *De virâ Circuli mensurâ*, printed at Amsterdam‡ in 1644 in quarto. Mr. PELL's refutation was dated Aug. 1, 1644, and concludes thus: *Abunde igitur sufficit hæc unica pagella tot Cbaris Librisque aliquoties editis refutandis, triumphæ borularum spatio nostra premens Vestigia, post pauculas multiplicationes & divisiones, tot annorum incredibiles LONGOMONTANI Labores prorsus periisse videbis. Ita censeo JOANNES PELLIVS, Coritano-regnus, Anglus, Matheficus in illustri Amstelodamensium Gynasio Professor. Calendis Sextilibus, anno 1644.*

In June, 1646, he was invited by the Prince of Orange to be professor of philosophy and mathematics at Breda in the college newly founded there by his highness, with the offer of a salary of 1000 guilders a year§; which he accepted of, and upon his removal to Breda was eased of the professorship of philosophy\*, and discharged only the duties of that of mathematics, which he did, as he had done before at Amsterdam, with great success and reputation.

His *Idea Mathefosis*\*, which he had addressed to SAMUEL HARTLIB, Esq; who in 1639 had sent it to Mons. DES CARTES and Father MERSENNUS, was printed in 1650 at London in 12mo in English with the title of *An Idea of Mathematicks* at the end of Mr. JOHN DURIE's *Reformed Library-keeper*.

He left Breda and returned to England in 1652; and in 1654 was sent by the protector CROMWELL agent to the protestant cantons in Switzerland, his in-

\* MS. note of Dr. PELL.

† WOOD, ubi supra.

‡ Letter of Mr. PELL to Sir CHARLES CAVENDISH from Amsterdam, 9 July, 1646, N. S.

§ Letter to the same from Breda, 17 Novemb. 1646.

¶ It is printed by Mr. HOOKE in his *Philos. Colloq.* N°. 5. p. 127.

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struitions being dated March 30 of that year. His first speech in Latin to the deputies of Zurich was on the 13th of June following; and he continued in that city during most of his employment in Switzerland, in which he had afterwards the title of resident. Being recalled by the protector, he took his leave of the cantons in a Latin Speech at Zurich on the 23d of June, 1658; but returned to England so short a time before the protector's death, that he had no opportunity of an audience of him\*.

After the restoration he entered into holy orders, being ordained deacon March 31, 1661, and priest in June following, by Dr. ROBERT SANDERSON, Bishop of Lincoln; and on the 16th of that month was instituted to the rectory of Fobbing in Essex, given him by the King†. On the 5th of December following he brought into the upper house of convocation the calendar reformed by him assisted by Mr. SANCROFT, afterwards Archbishop of Canterbury. In 1663 he was presented by Dr. GILBERT SHELTON, Bishop of London, to the rectory of Laingdon in Essex, to which he was instituted on the 23d of July\*. Upon the promotion of that Bishop to the see of Canterbury in the next month, he became one of his grace's domestic chaplains, being then doctor of divinity; "and expected, as Mr. WOOD tells us, "to be made a dean; but being not a person of activity, as others, who mind "not learning are, could never rise higher than a rector. The truth is, he was a "shiftless man as to worldly affairs; and his tenants and relations dealt so un- "kindly by him, that they cozened him of the profits of his parsonage, and "kept him so indigent, that he wanted necessaries, even ink and paper, to his dy- "ing day." He was for some time confined to the King's-bench prison for debt; but in March 1682 was invited by Dr. WHISTLER to live in the college of physicians, where he continued till June following, when he was obliged by his ill state of health to remove to the house of a grand-child of his in St. Margaret's church-yard, Westminster‡. He died at the house of Mr. COTHORNE, reader of the church of St. Giles's in the Fields, in Dyot-street in that parish on Saturday 12 December 1685, and was interred by the charity of Dr. RICHARD BUSBY, master of Westminster school, and of Dr. JOHN SHARP, rector of St. Giles's church, in the rector's vault under that church\*. He was declared a fellow of the Royal Society May 20, 1663, by the council, soon after the granting of the second charter to the Society. He published in 1664, in quarto without his name, an *Exercitation concerning Easter*. He drew up *A Table of ten thousand square Numbers, namely, of all the square Numbers between 0 and an hundred millions, and of their Sides or Roots, which are all the whole numbers betwixt 0 and ten thousand. With an Appendix concerning the Endings or last Figures of all square numbers*: printed at London 1672, in folio. He published his *Inaugural Oration*, made upon entering upon his professorship at Breda. He made great alterations and additions to RHONIUS's *Algebra*, printed at London 1668, in quarto, under the title of *An Introduction to Algebra, translated out of the High Dutch into English by THOMAS BRANCKER, M. A. much altered and augmented by D. P. [i. e. Dr. PELL.] Alfo*

\* From his original papers.

† General Dictionary, *ubi supra*, p. 251.

‡ Ibid.

§ Bp. KENNET's register and chronicle, p. 575.

\* Ibid.

† General Dictionary, p. 251, 252.

‡ WOOD, col. 254.

\* *Ubi supra*.

*a Table of odd Numbers less than one hundred thousand, shewing those, that are incompressible, and resolving the rest into their Factors or Coefficients.* Supputed by the same THOMAS BRANCKER. A copy of this book, with many corrections and improvements of Dr. PELL, is amongst his papers in the Royal Society. He demonstrated the second and tenth books of EUCLID, which piece was in manuscript in the library of the Lord Brereton at Brereton in Cheshire, as likewise ARCHIMEDES'S *ΨΑΛΜΙΣΤΗΣ*, and the greatest part of DIOPHANTUS's six books of arithmetic; of which author he was preparing in August 1644 a new edition, in which he would have corrected the translation, and made new illustrations\*. He designed likewise to publish an edition of APOLLONIUS, but laid it aside in May, 1645, at the desire of GOLIUS, who was engaged in an edition of that writer from an Arabic manuscript given him at Aleppo eighteen years before†. Besides those of his papers, which were left by him at Brereton in Cheshire, where he resided some years, being the seat of WILLIAM Lord Brereton, who had been his pupil at Bre'ca, a great quantity of the rest came after his death into the hands of Dr. BUSBY, which Mr. HOOKE reporting to the Royal Society, February 10, 1681, was desired to use his endeavours to obtain those papers for the Society. But they continued buried under dust, and mixed with the papers and pamphlets of Dr. BUSBY in four large boxes, till June 1755, when the writer of this history procured them for the Society by means of the reverend RICHARD WIDMORE, M. A. librarian of the church of St. Peter's Westminster, from the trustees of Dr. BUSBY. The collection contains not only Dr. PELL's mathematical papers, letters to him, and copies of those from him, &c. but likewise several manuscripts of Mr. WALTER WARNER, the philosopher and mathematician, who lived in the reigns of the Kings JAMES I. and CHARLES I.

Dec. 2. SAMUEL PEPYS, Esq; president in the chair.

The minutes of November 25 were read; as likewise the proceedings of the general meeting upon St. Andrew's day for the election of a president and officers for the ensuing year.

Mr. HOOKE read a paper of observations upon Mr. NORRIS's book, wherein he declared, that he had formerly shewn a way for describing the rhumb-line and some other things relating to navigation: and that he had perused Dr. WALLIS's observations upon Mr. NORRIS's book.

Mention being made of an universal measure, Mr. HOOKE said, that he had thought of a natural body, which might be an universal standard, which he would discover at the next meeting.

The minutes of the Philosophical Society at Oxford of November 17 were read, mentioning a catalogue of several leaves and seeds brought from St Christopher's; a dissection by Mr. PIGOTT, junior, of the fund of the bladder made in a dog after Dr. LISTER's directions, which succeeded well, the dog being recovered

\* Letters of Mr. PELL to Sir CHARLES CALVERT, from Amsterdam, Aug. 13, 1644.

† Letter to the same from Amsterdam, May 13, 1645.

gradually

gradually in a fortnight's time; lasteals proceeding from the bottom of the stomach, &c.

A letter of Mr. JOSUA WALKER, dated at Oxford November 26, was read, mentioning an experiment made there, that twelve ounces of water were sufficient to buoy up a vessel, that weighed above twenty pounds. It was made use of to confirm the tenth propolition of the fourth book of STEVINUS's statics.

This letter mentioned likewise an experiment of a new fort of pump with two suckers lying in two sockets close at the bottom of a well, &c.

Mr. HALLEY gave an account, that he had read over the experiments about the declination at Nuremberg, and the application of the poles of the needle to the ends of a piece of iron held perpendicular, observed by a master of a ship, when he crossed the æquator. He doubted whether the observations made at Nuremberg five years before were exactly true, it being certain, that the declination varies in other places.

He desired, that order might be given to seamen, not only to observe the different applications of the poles of the needle to the iron in crossing the line near Guinea, but also as they return upon the line towards the East-Indies.

A letter was communicated, written by Mr. WILLIAM NICHOLSON to Mr. OBADIAH WALKER, master of University-college Oxford, and dated at Carlisle, November 2, 1685, concerning two Runic inscriptions, one at Bridekirk and the other at Beaucastle; the latter of which is described, with a conjecture at the meaning of the characters, which were legible. The secretary was ordered to desire, that this letter might be printed<sup>1</sup>.

A letter of Mr. WILLIAM MOLYNEUX to Mr. ASTON, dated at Dublin, Oct. 27, 1685<sup>2</sup>, was read, containing some objections to Dr. GARDEN's letter to Dr. MIDDLETON concerning the trade winds, and an account of his first discovering the circulation of the blood in a newt or salamandra aquatica about two years before, together with an extract of the register of the Dublin Society May 26, 1684, attesting the trials made before them.

Mr. ASTON declared, that he had received an account thereof from Dublin above a year before, which would appear both from the minutes and letter-books; so that this discovery must be owned to be Mr. MOLYNEUX's, except Dr. GARDEN can bring authorities, which did not yet appear.

A letter of Mr. ST. GEORGE ASHE to Mr. ASTON, dated at Trinity-college Dublin, Sept. 16, 1685<sup>3</sup>, was read, concerning the continued rains upon the 18th of August and the night before, which caused the river Shannon about Athlone

<sup>1</sup> It is printed in the *Philos. Transact.* N°. 178. in the *Philos. Transf.* N°. 177. p. 1236. p. 1237.

<sup>2</sup> Letter-book, vol. x. p. 222.

<sup>3</sup> Letter-book, vol. x. p. 259. It is printed

a hundred miles from the sea to run backward for twenty four hours together, there being never any tide there : of which he gives an ingenious reason drawn from the nature of the channel, being narrow and bounded below, and flat and laky above the place, where several brooks heightened with sudden rains fall in.

This letter mentioned likewise a new lamp invented by the Bishop of Ferns<sup>1</sup>, to enlighten a large hall or church : a man, who for many years squinted every other day, on which his eyes were very weak ; and afterwards chinged to a constant daily squint : a new philolophical character invented by Mr. KEUGH ; and a liquor of Dr. MULLEN, which being injected into one dog's veins made him die presently apoplectic, and poured down another dog's throat, fluxed him.

Another letter of Mr. ASHE to Mr. MUSGRAVE, dated at Dublin, October 10, 1685<sup>2</sup>, was read, concerning a girl in Ireland, who had several horns growing on her body, between thirteen and fourteen years of age, born at Waterford. The horns first appeared about the third year of her age : they were most about her joints and flexures, and fastened to the skin like warts. Those at the end of her toes were as long as the toes : those at the elbows four inches long, and twisted like a ram's horn.

Dr. SLARE shewed one of the crystals of amber, being shot in the exact figure of a cross ; some of the water, wherein the salts were dissolved, having been evaporated by Dr. PAPIN.

Dr. PAPIN shewed some raw cherries, which had been preserved in the gelly of bones ever since the 27th of July last. They were well coloured, but something flunk, well tasted as was the gelly.

December 9, at a meeting of the COUNCIL were present

Dr. GALE vice-president

Lord Vaughan	Mr. FLAMSTEAD
Sir CYRIL WYCHE	Mr. HAYNES
Sir RICHARD BULKELEY	Dr. ROBINSON
Mr. HILL	Dr. TYSON
Mr. HERBERT	Mr. MEREDITH
Mr. PERRY	Mr. ASTON.

The vice-president Dr. GALE was sworn.

Mr. ASTON declared to the council, that he had laid down his place of secretary<sup>3</sup>.

Dr.

<sup>1</sup> Dr. NARCISIUS MARCH.

<sup>2</sup> Later book, vol. x. p. 263. It is printed in the *Philos. Trans.* N°. 176. p. 1202. for November 1685. Vol. IV.

<sup>3</sup> The occasion and manner of his and Dr. ROBINSON's resignation of the office of secretaries to the Society will appear from the following passage in a letter of Mr. EDMUND HALLAT

Dr. ROBINSON desired likewise to be excused being secretary.

It was ordered, that a summons be sent out for the members of the Society to meet upon the Wednesday following at three o'clock in the afternoon for the choosing two new secretaries.

WILLIAM MOLYNEUX, Esq; and Mr. ST. GEORGE ASHE were proposed as fit to be elected into the Society.

At a meeting of the SOCIETY on the same day, Dr. GALE vice-president in the chair.

WILLIAM MOLYNEUX, Esq; and Mr. ST. GEORGE ASHE were proposed as candidates.

Mr. SAMUEL FOLEY's *Natural Arithmetic*<sup>m</sup>, dedicated to the Society, was read, and ordered to be printed.

The problem of ARCHIMEDES solved by the Lord Viscount Montjoy, president of the Dublin Society, was read, and ordered to be printed.

A letter of Mr. WILLIAM MOLYNEUX, containing his observations upon Mr. HEVELIUS's *Annus Climactericus*, was read, and a copy of it given to Mr. HALLEY.

An order was made for summoning the Society on the Wednesday following at three o'clock in the afternoon for the electing two secretaries in the room of Mr. ASTON and Dr. TANCRED ROBINSON, who desired to be excused from being secretaries any longer.

Dec. 16, at a meeting of the COUNCIL were present

to Mr. WILLIAM MOLYNEUX, dated at London, March 27, 1686, Supplement to letter-books, vol. 4. p. 330. "On St. Andrew's day last, being our anniversary day of election, Mr. PAPPS was continued president, Mr. ASTON, secretary, and Dr. TANCRED ROBINSON chosen in the room of Mr. MUSGRAVE. Every body seemed satisfied, and no discontent appeared any where, when on a sudden Mr. ASTON, willing, as I suppose, to gain better terms of reward from the Society than formerly, on December 9th in council declared, that he would not serve them as secretary, and therefore desired them to provide some other to supply that office; and that after such a passionate manner, that I fear he has lost several of his friends by it. The council,

"resolved not to be so served for the future, "thought it expedient to have only honorary "secretaries, and a clerk or amanuensis, upon "whom the whole burthen of the business "should lie, and to give him a fixed salary, "so as to make it worth his while, and he to "be accountable to the secretaries for the performance of his office. According to which "resolutions Sir JOHN HOBBYNS and Dr. GALE "were chosen secretaries; and on January 27th "last they chose me for their under-officer with a "promise of a salary of fifty pounds per ann. "at least."

<sup>m</sup> It is inserted in the letter-book, vol. x. p. 230. under the title of *Computatio Universalis, seu Logica Rerum*.

SAMUEL PEPYS, Esq; president

Lord Vaughan

Sir JOSEPH WILLIAMSON

Sir RICHARD BULKELEY

Sir JOHN HOSKYNs

Sir CYRIL WYCHE

Mr. HILL

Mr. HERBERT

Dr. LISTER

Dr. ROBINSON

Dr. TYSON

Dr. GALE

Mr. MEREDITH

Mr. PERRY

Mr. ASTON.

The question was put, whether the council should recommend to the Society the choice of another clerk, as being for the use of the Society and the ease of the secretaries: which was carried by ten votes in the affirmative against five in the negative.

The question being put, whether the last secretaries should be gratified for their care and pains and service, it was carried in the affirmative.

It was ordered, that Mr. ASTON shall have as a gratuity sixty pounds: and That Mr. MUSGRAVE shall have a piece of plate of sixty ounces, with the thanks of the Society and their arms upon it.

At a meeting of the SOCIETY on the same day, the president in the chair.

After a long debate, Sir JOHN HOSKYNs and Dr. THOMAS GALE were chosen secretaries by a great majority in the room of Dr. TANCRED ROBINSON and Mr. FRANCIS ASTON, who resigned the said office at the last meeting.

This affair took up so much time, that nothing else was done at this meeting.

The Society then adjourned till after Christmas.

1681. Jan. 13, at a meeting of the COUNCIL were present

SAMUEL PEPYS, Esq; president

Lord Vaughan

Sir JOSEPH WILLIAMSON

Sir RICHARD BULKELEY

Sir CYRIL WYCHE

Mr. HILL

Mr. HERBERT

Mr. MEREDITH

Dr. LISTER

Mr. ASTON

Mr. PERRY

Dr. ROBINSON.

A committee was chosen to audit the accounts of Mr. HILL as treasurer, consisting of the president, Sir RICHARD BULKELEY, Mr. MEREDITH, Mr. PERRY, and Dr. GALE.

There was much discourse concerning the qualifications and office of the clerk, but nothing resolved upon.

M m m 2

At

At a meeting of the SOCIETY on the same day, Dr. LISTER vice-president in the chair.

Part of a letter of Mr. LEEWENHOECK, translated by Mr. LODWICK, was read, concerning embryo-plants, which he affirmed himself to have found perfectly formed in some sorts of seeds, particularly the cotton-seed \*.

Mr. LODWICK was desired to proceed in translating the remainder of that letter.

Dr. LISTER said, that plants are sometimes full of a mealy substance, viz. in the spring: which substance, after the plants are run up, is no longer found in them.

Dr. PAPIN read a paper of his, containing an account of the contrivance of his water-engine for circulating water; which was ordered to be registered †.

He read likewise his thoughts concerning the water-engine at London-bridge, which raises water without intermission ‡. He affirmed, that though the inward contrivance of that pump was concealed, he could make another, which should have the same effect, and produced a scheme of his invention.

A letter in Latin from JOHN WEICHARD VALVASOR, dated at Wagenfperg in Carniola, December 3, 1685, N. S. §, was read, desiring a correspondence with and election into the Society; giving an account of himself and his performances, and of the wonderful lake of Zirknitz in Carniola, and promising the natural history of it.

Dr. GALE was desired to return him an answer.

Jan. 20. Dr. LISTER vice-president in the chair.

Dr. PAPIN read a farther discourse concerning his engine, that raises and circulates water.

Mr. POVEY remarked, that one Mr. DESSOUN had raised more water for the Earl of Winchelsea with an ordinary and easy wheel.

Mr. HEVELIUS's letter to Mr. ASTON, dated at Dantzick, Decemb. 29, 1685, N. S. ¶, was read, containing his observations of the total eclipse of the moon, Decemb. 10, N. S.

Dr. PAPIN shewed a glass of strawberries, preserved in a jelly of bones, which

\* Letter-book, vol. xi. p. 1. It is printed in the *Philos. Transact.* N°. 109. p. 700.

† Register, vol. vi. p. 236. It is printed in the *Philos. Transact.* N°. 178. p. 1274.

‡ Register, vol. vi. p. 291.

§ Letter-book, vol. x. p. 273.

¶ Ibid. p. 275. Part of it is printed in the *Philos. Transact.* N°. 178. p. 1256.

were found not to answer expectation, the fruit being spoiled, and the smell and taste gone into the gelly.

Dr. SOLOMON REISELIUS's letter to Mr. ASTON, dated at Stutgard, Octob. 8, 1685<sup>1</sup>, concerning the Wirtemberg syphon, was read; whereby it appeared, that Dr. PAPIN had exactly conjectured at the composition of the same syphon.

This letter confirmed likewise the writer's thoughts of Dr. PAPIN's engine for circulating-water, with proposals of his own about doing the same thing: which were referred to Dr. PAPIN to consider of and answer.

January 27, at a meeting of the COUNCIL, Mr. PEPYS the president in the chair, and most of the council present, upon consideration had of the charter, were of opinion, that the Society was not limited to the number of their clerks; and that the choice of clerks is to be made by the majority of thirty one at least, or of the members present, if more than thirty one.

Orders agreed upon by several councils, containing their opinion concerning the qualifications necessary for a clerk to be chosen by the Society till St. Andrew's day following

1. Resolved, that if a fellow of the Society be chosen into the office of clerk, he shall before his admission to his office resign his fellowship.
2. If any person other than a fellow shall be chosen clerk, he shall be incapable of being chosen a fellow, while he holdeth the office of clerk.
3. That he shall have no other employment.
4. That he shall constantly lodge in the college, where the Society meeteth.
5. That he shall be a single man without children.
6. That he shall obey all orders from the president, council, or secretaries.
7. That he shall be master of the English, French, and Latin tongues.
8. That he shall be able to write a fair and legible hand.
9. That he shall be completely seen in the mathematics and experimental philosophy.
10. That all letters of philosophical correspondence shall be signed by one of the secretaries, and not by the clerk.
11. That the clerk shall be accountable to the council for the performance of his office, as it shall be from time to time appointed to him.
12. That his salary for copying, entering, and the performance of all other parts of his office, shall be after the rate of fifty pounds *per annum* at the least, he being found as above, and performing his duty to the satisfaction of the council.

The duty of the clerk.

1. He shall take the minutes of the Society in a book, and not in loose papers.
2. He shall draw up the minutes at large against the next meeting.

<sup>1</sup> Letter-book, vol. x. p. 203. Part of it is printed in the *Philosophical Transactions*. N<sup>o</sup>. 178. p. 1272.

3. He shall enter the minutes, after they have been read at the board, in the journal-books.

4. He shall draw up all letters, and bring them to be signed by one of the secretaries.

5. He shall index the books of the Society.

6. He shall keep a catalogue of all the gifts to the Society.

These orders drawn up by the council, touching the qualifications and business of the clerk, were twice read before the Society at the time of election : and it being queried, whether the Society might not dispense with some of the said qualifications, it was answered by the president, that the council only gave them as the result of their thoughts concerning the person fit to serve them ; but that they were still at liberty to choose whom they pleased.

At a meeting of the SOCIETY on the same day, Mr. PEPYS president in the chair.

This day being set apart for the choice of a clerk, to be assistant to the secretaries, little else was done ; only

Dr. PAPIN was ordered to provide some experiments against the next meeting.

Then the result of the debates of the council concerning the qualifications and business of a clerk having been twice read, after some discourse thereupon, the Society proceeded to their choice.

The members present were thirty eight, of which upon balloting Dr. SLOANE had 10 voices

Dr. PAPIN	8
Mr. SALISBURY	4
Mr. HALLEY	16.

But the majority of the members present being requisite to an election, the ballot was repeated, and then

Dr. SLOANE had	9 voices
Dr. PAPIN	6
Mr. HALLEY	23.

Mr. HALLEY being thus chosen was sworn before the council.

Sir. ROBERT GORDON was proposed candidate by Sir CHRISTOPHER WREN.

The president then appointed Sir JOSEPH WILLIAMSON and Sir CYRIL WYCHE his vice-presidents.

Feb. 3, at a meeting of the COUNCIL were present

Mr.

## Mr. PEPYS president

Lord Vaughan  
 Sir JOSEPH WILLIAMSON  
 Sir JOHN HOSKYNs  
 Mr. HILL  
 Mr. EVELYN

Mr. HERBERT  
 Dr. TYSON  
 Dr. GALE  
 Mr. PERRY.

It was ordered and resolved, that Mr. EDMUND HALLEY, as clerk, do constantly and of course attend at the councils of the Society, and be always summoned, and do there take minutes sitting uncovered at the lower end of the table; but to withdraw when particularly ordered:

That he do inquire and satisfy the council what inventories of the Society's papers were made, when they were taken into the care of Mr. HOOKE and Mr. ASTON:

That he bring in an account of what he finds wanting of the Society's books and papers; and that he inquire after them:

That he and Mr. HUNT make a list of the things in the repository; and that Mr. HUNT have notice of this order in writing: and that Mr. HILL and Mr. HALLEY desire Dr. GREW to do for the Society what he promised, in order to the making of a catalogue of the repository first; and that then Mr. HALLEY and Mr. HUNT continue and perfect the list:

That at the next council the matter of the *Transactions* be considered:

That Sir JOHN HOSKYNs, Dr. GALE, Dr. LISTER, Mr. HILL, and Dr. TANCRED ROBINSON be a committee to consider of the disposal of the *History of Fishes*: and

That against the next council the members come prepared to give their thoughts about the means of making experiments in a philosophical method.

Sir ROBERT GORDON having been proposed candidate by Sir CHRISTOPHER WARREN was approved by the council to be proposed to the Society for election.

At a meeting of the Society on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

Sir ROBERT GORDON having been proposed in the last council and approved, was chosen fellow of the Society, and admitted.

Dr. REISELIUS's letter concerning the Wirtemberg syphon was read a second time; as also Dr. PAPIN's answer to it in Latin'.

Dr. SLOANE presented the Society with several ores and mineral substances said to be found in England. He was desired to make a catalogue of them.

Mr. HOOKE brought in an invention of his for nicely discovering the alterations of the height of the barometer by obviating the objections against Mr. HUBIN's way, of the different counterpressure".

<sup>a</sup> Letter-book, vol. iv. p. 284.

<sup>b</sup> His *Experiments and Observations for the Im-*

*provement of the Barometer*, read this day before the Society, are printed in his *Phil. Exper. &c.* p. 169.

He

He mentioned also another experiment, to shew the advantages of telescopic sights over plain ones.

He was desired to explain both these at the next meeting.

Dr. PAPIN, for the entertainment of the Florentine envoy, Signor CAPPONI, shewed again the experiment of water boiling *in vacuo* by being put into cold water; and delivered a paper attempting to assign a reason of that odd phenomenon by two experiments, which he likewise shewed, and was desired to repeat at the next meeting. His paper was as follows \* :

“ A glass half full of water, and exhausted of air, was shewn in the Royal Society about a year ago : and it was tried, that this glass being heated a little, and then put into cold water, or ice, the water included in the said glass would thereby be set a boiling with a great violence. This seemed so surprising, that every man wished to know the true cause of it. Now from two other experiments, somewhat akin to this, methinks, I guess at a good reason to be given of this odd phenomenon : I do therefore make bold to submit it to the examination of the Royal Society. The first experiment is, that ordinary water being put *in vacuo* will produce a great many bubbles; the second is, that water having been kept for a while in the receptacle of a wind-gun, it will likewise emit abundance of bubbles as soon as we shoot the gun, and give the air liberty to expand. This shews, that liquors being freed from an external pressure will make bubbles upon the score of the elastic particles lurking in their pores, as has been observed long ago by the hon. Mr. R. BOYLE. I do therefore believe, that the vapours raised by heat in an exhausted glass will make a pressure, which is quickly taken off, when we condense those vapours by putting the glass into cold water, or ice : from whence it follows, that the liquor included in the glass must produce abundance of bubbles by the reason aforesaid. I have prepared all necessaries to make the three aforementioned experiments, that by looking upon them the Royal Society may judge, whether it is not very probable, that they depend upon the same principle.”

Signor CAPPONI mentioned a book of a philosophical nature lately published at Florence, intitled, *Lettere dua di Giuseppe del Papa, Lettore di Pisa, scritti al signor dottore Redi, nella prima delle quali tratta del umido e del freddo, & nella seconda del caldo e del secco.*

He promised at his return to procure the Society a proper correspondent at Florence.

February 10, at a meeting of the COUNCIL were present

Sir JOSEPH WILLIAMSON vice-president

Lord Vaughan

Sir CYRIL WYCHE

Sir JOHN HOSKYNs

Mr. HENSHAW

Mr. HILL

Mr. MEREDITH.

Dr. GALE

Dr. ROBINSON

Mr. ASTON

Mr. HAYNES

Mr. PERRY.

\* Register-book, vol. vi. p. 272.

Mr.

Mr. HALLEY reported from Mr. Hooke, that there was no particular inventory of the Society's papers taken, when they were delivered into his custody.

Mr. ASTON being present affirmed likewise, that the said papers were not delivered to him by inventory, but that in the beginning of Sir CYRIL WYCHE's year there was an account taken of them, entered in the journal-book of that time.

Inquiry being made after a part of the journal of the Society, which was wanting in the Society's presses, Mr. ASTON said, that he had it in his possession; as likewise all the copies of the journals and registers except two.

It was ordered, that Mr. HUNT carry the last journal and the journal of the council to Mr. ASTON to be completed by him: and that Mr. ASTON give in the original papers belonging to the Society in his custody: and

That the consideration of the *Transactions* be put off till the next council.

The debate about the *History of Fishes* being entered upon, it was alledged by Mr. ASTON, that the book being printed at Oxford, and the plates at London, as likewise the *Appendix*, there could be no fraud in the printer at Oxford. Against which it was objected, that the cuts being designed for a book apart, any number of the books, that might be in the printer's hands, might by that means be made complete.

The council then agreed with their committee, that they could not proceed to make any disposal of the *History of Fishes*, till they should hear from Dr. PLOT, and have security from Mr. HALL the printer, that he had printed no more than the number, which the Society paid for.

At a meeting of the SOCIETY on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

The minutes of the last meeting were read.

Dr. SLOANE brought in again the ores and mineral substances, which he had presented at the last meeting, with a catalogue of them, amounting in all to N°. 50; as likewise a farther present of the like substances, viz. from N°. 26 of his catalogue to the end.

Mr. HOOKE remarked, that the best way to preserve some of those substances, whereof the quantity was but very little, was by glewing them down to cards to be stuck to the bottom of a box.

Sir JOHN HOSKYNs on occasion of these earths mentioned, that he had observed one near Market Lavington in Wiltshire, that was very good umber.

Mr. HOOKE said, that these brown earths are a tincture given by water running through some iron mineral.

Dr. SLOANE affirmed, that some sorts of yellow mundic would strike fire; and that upon striking or breaking, it has a very strong smell resembling garlic; and that once on breaking a great piece, the scent had been so strong as almost to suffocate him.

Sir JOHN HOSKYNs said, that the several mineral colours are properly applied to the painting of glafs, as not being destroyed by fire.

Mr. WALLER was put in mind of his catalogue of colours; which he promised to bring in at the next meeting.

Mr. HOOKE mentioned, that he had in his custody some English cobalt, which is the mineral, out of which blue smalt is made. He was desired to produce it to the Society, which he promised.

Mr. BOYLE's book, intitled, *An Essay of the great Effects of even languid and unbecomed Motion: whereupon is annexed an experimental Discourse of some little observed Causes of the Insalubrity and Salubrity of the Air and its Effects*, was presented from the author by the hands of Sir ROBERT GORDON.

Mr. HOOKE was desired to shew his experiment about the comparison of plain and telescopic sights at the beginning of the next meeting, it being now too dark to see it with the exactness requisite.

He reported, that the papers of the learned Dr. PELL, lately deceased, were partly in custody of Dr. BUSBY, and the rest at Brereton in Cheshire. He was desired to do his endeavour to obtain the said papers for the Society.

Mr. HOOKE read his discourse of the improvement of the barometer by taking off the inequality of the pressure of the coloured liquor in Mr. HUBIN's way.

He was desired to give it in to be registered; but he desired to be excused at that time, promising to bring in an account thereof shortly.

He mentioned upon this occasion, that on Wednesday the 3d instant the quicksilver was exceedingly high, viz. 30. 6 inches; and that he had never observed it higher:

That once a year in the winter-months of December, January or February the quicksilver stands higher than in all the rest of the year besides, generally prefiguring frost.

Mr. HOOKE asserting it, it was queried by Dr. LISTER if the register or

It is inserted in the register, vol. vi. p. 293. It is printed in *Philos. Transact.* N<sup>o</sup>. 185. p. 241. for November and December 1686.

journal

journal of the Society mentioned a glass cane of thirty two foot long made for the Torricellian experiment.

Mr. Hooke mentioned an instrument of his contrivance, whereby he could discover the thickness or thinness of the air, abstracted from its gravity; which he was desir'd to perfect and bring in.

He was desir'd to proceed to shew his experiment, whereby he would establish a general weight and measure by means of a drop of quicksilver; it being queried by some of the members, whether the smooth part of a grain could, by any means, be discovered in a scale.

Sir ROBERT GORDON said, that he had seen the 1000th part of a grain weighed; and that he had a beam capable of doing it, made by one Mr. NEILE.

Dr. PAPIN shewed an experiment proving the quantity of air compress'd in the chamber of his wind-gun; which did not succeed, by reason, that the receiver was not capacious enough.

Sir ROBERT GORDON desir'd, that Dr. PAPIN would by the means of his air-gun supply with fresh air an animal included in a small space, to try, if thereby the life of the animal might not be prolonged.

Feb. 17. Sir JOSEPH WILLIAMSON vice-president in the chair.

The minutes of the last meeting were read.

Mr. WALLER presented his table of colours neatly drawn with his own hand\*. It was order'd to be put in a frame with a glass before it to be hung up in the Society's meeting-room.

Mr. Hooke shewed his experiment to prove the excellency of telescopic sights above plain ones, by comparing a direction by the naked eye with a radius of ten feet, with that of a telescope of eight inches; and it appear'd to the satisfaction of all present, that there was a very great advantage in the telescope.

He promised to bring in at the next meeting an invention of his, whereby the limb of a very small instrument may be divided so as to have as many discernible parts, as a very large one, according to the usual manner of the division of instruments\*: as likewise another contrivance to set such a small instrument perpendicularly to take altitudes as well as by a larger radius.

He affirm'd, that Mr. HUBIN's contrivance of the barometer was formerly brought in to the Society by himself, and that he in truth was the inventor thereof.

\* It is printed in the *Philos. Transact.* vol. xvi. N<sup>o</sup>. 179. p. 24. for Jan. and Feb. 1686.

\* Register, vol. vi. p. 2.

Mr. HALLEY was ordered to search the books of the Society, to see, whether there be any record thereof.

Mr. HOOKE promised again to shew an instrument, that should distinguish the gravity of the ambient air.

He being called upon for the experiment, whereby he would make an universal measure and weight from a drop of quicksilver, desired to be excused for some time till the sun had gotten more northward.

Mr. HILL affirmed, that the 1000th part of a grain had been discernible in several trials made formerly at Gresham-college by Dr. GODDARD.

Mr. HOOKE read and gave in an account of Mr. BOYLE's book on *languid and unbreeded Motion*, presented at the last meeting.

Dr. PAPIN's account of the compression of the air in his wind-gun<sup>a</sup> was read, wherein he asserted the compression to have been into a 60th part of the space, which it naturally takes up; and that the utmost degree of compression to be made by the same force depends upon the diameter of the bore of the gun.

This gave occasion to discourse of respiration; and it was queried by some, whether the blood can circulate through the lungs, whilst the lungs are not distended with air. Whereupon it was ordered, that Mr. HALLEY should consult the books of the Society, to see, what experiments had been made to illustrate the questions about respiration, particularly as to the time, during which the same air will serve for the maintenance of life without renewing.

It was ordered likewise, that Dr. TYSON's *Anatomy of the Porpoise* should be consulted as to the contrivance of the lungs of fishes of the cetaceous kind.

Dr. PAPIN shewed some more strawberries preserved in the gelly of bones; which, though they were not so well as might be desired, yet the Society thought the thing worth prosecuting.

Mr. MUSGRAVE's letter of January 31, 1687, was read, and the paper inclosed being of some rare plants found in north Wales was delivered to Dr. ROBINSON, to see, whether, as it was pretended, those plants were omitted in the last edition of Mr. RAY's catalogue of English plants.

Dr. SLOANE promised to bring in a large calculus mentioned in a letter of Mr. MUSGRAVE to Dr. GALE, dated at Oxford January 17, 1687, to have passed the urethra of a woman, Mrs. ELIZABETH VERNON of Wallingford, aged sixty three years, Aug. 7, 1685. It then, according to that letter, weighed 3 ounces

<sup>a</sup> Register, vol. vi. p. 298.

<sup>a</sup> Letter-book, vol. x. p. 284.

avordupois. The length of it was  $4\frac{1}{2}$  inches, and the compass of it  $5\frac{1}{2}$  inches<sup>4</sup>.

Mr. HOOKE presented a Roman brick taken out of London wall near Aldgate; the dimensions whereof were 11 inches in breadth, 17 in length, and  $1\frac{1}{2}$  in thickness.

Feb. 24. Sir JOSEPH WILLIAMSON vice-president in the chair.

It appeared from the journal of the Society, that the contrivance of the barometer made and published by Mr. HUBIN in the year 1673, was brought in to the Society by Mr. HOOKE in June 1688.

It appeared likewise, that Mons. JUSTEL had given the Society an account of scales at Paris turning with the 2500th part of a grain.

Dr. SLOANE brought in a substance called *sauga*, from Surat, said to be the pith of a tree, somewhat resembling tallow, and which would not granulate; used in India instead of rice.

Upon occasion of the brick, presented at the last meeting by Mr. HOOKE, Dr. GALE remarked, that those large bricks were such as VITRUVIUS called *diatomi*; and that their use was to bind the wall together, being generally the whole thickness thereof.

It was queried, whether that brick were not rather British than Roman: to which Mr. WALLER answered, that the bricks of the walls of old Verulam, which are undoubtedly Roman, are exactly of the same dimensions with this.

It being supposed by some, that this brick might have contracted some magnetism, it was tried by a small needle, but found to have no respect thereto.

Mr. HOOKE read a paper vindicating himself from some injuries, which he conceived done him by Mr. HEVELIUS in his *Annus Climactericus*.

Mr. HAYNES was desired to bring in an account of that book of Mr. HEVELIUS.

Mr. HOOKE promised to bring in at the next meeting his contrivance for setting a small instrument perpendicular as exact as a larger.

He likewise shewed a glass-cane bent at one end, to shew the proportional weight of mercury to the liquors.

Dr. PAPIN shewed the experiment of a bird included in a small space of air till it was sick, and then relieving it by supplying it with fresh air out of his wind-gun, which had been compressed sixty times: and it was found, that the air seemed as good after compression as before, and gave present relief to the bird.

<sup>4</sup> See likewise *Philos. Transact.* N<sup>o</sup>. 178. p. 1271.

Dr. PAPIN shewed some more strawberries and raspberries in his jelly of bones, which were as the former.

March 3, at a meeting of the COUNCIL were present,

	Mr. PEPYS President
Lord VAUGHAN	Mr. HAYNES
Sir CYRIL WYCHE	Mr. MEREDITH
Sir JOHN HOSKYNES	Mr. PERRY
Mr. HILL	Dr. ROBINSON.

It was ordered, that Mr. HALLEY should wait upon Mr. ASTON about the copies of the journal and register books of the Society in his hands; as likewise to have from him the original papers and letters belonging to the Society.

Two letters, one from Dr. PLOT, and another from Mr. JOHN HALL, relating to the *History of fishes*, were read; and it seeming to the council, that the answer of Dr. PLOT argued some discontent in him, they thought fit to order a letter to be written to him, to satisfy him of the respects of the Society, and to remove from him all jealousies and misunderstandings about the affair of that book.

It was ordered, that the committee appointed to consider of the *History of fishes* do proceed therein; and that according to their direction a letter be sent to Mr. HALL: And,

That Mr. HALLEY draw up *the Transactions*; and that when they are so drawn up, they shall be perused and approved by one of the secretaries.

Mr. HOOKE being called in was desired to bring in a scheme of a method for making experiments; which he said he would consider of against the next meeting.

At a meeting of the SOCIETY on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

Dr. GALE proved out of VITRUVIUS, l. 2. c. 8. that in his time building with brick in the city of Rome was prohibited; and that PLINY agrees in his dimensions of a Roman brick with those of this brick saying, that it was *latus pedes, longum sesquipede*; VITRUVIUS, on the contrary saying, that it was *longum pedes, & latus semipede*, l. 2. c. 3. so that PLINY seems to be understood of the *diatrix*, whose length was equal to three breadths, or one length and one breadth, of the other sort of brick mentioned by VITRUVIUS, and whose use was undoubtedly by laying here and there a course of them to bind and strengthen the wall.

Dr. GALE likewise observed, that there were several manuscript copies of VITRUVIUS, which he knew of, in our English libraries.

It was ordered, that an inquiry should be made of Mr. ASTON for a root given

given him for the Society by Mr. JUSTEL; which tinged oil, or any unctuous substance red.

Two notes from Mr. JUSTEL were read; the one giving an account of a model of a galley, in which one man can manage 60 oars, and yet tend the sails at the same time;\* and that a method had been found out of raising the Seine water to serve the fountains at Versailles: The other mentioning a piece of rock crystal naturally of a facette cut, and of a very fine water, and so hard as to cut glass.

Monf. JUSTEL inquiring in one of those notes after a map of the English plantations, made by one HORNE an Hungarian, the Society ordered, that he should be presented with that made by HARMAN a Bohemian, in whose name they conceived Monf. JUSTEL to have been misinformed.

Mr. HOOKE gave an account of conveying air under water for the use of diving by a chain of buckets inverted, which he had formerly brought in Feb. 17, 1662: And it was ordered, that it should be seen what account there is of this experiment in the register.

It was likewise ordered, that the Society's books should be searched, in order to see what had been done towards the improvement of navigation.

Part of Mr. LEEWENHOEK's letter of Oct. 12, 1685, was read, concerning chyle, sweat, pores of the skin, the crystalline humour of the eye, and the optic nerve. The rest was reserved to another meeting.

Mr. HOOKE shewed his way of setting a small instrument perpendicular by means of a triangular pendulum; which he was desired to bring in an account of in writing.

Mr. WALLER having been desired to make an index to N<sup>o</sup> 6 of the journal books, he this day returned it with a most complete index.

Dr. PAPIN shewed an experiment of shooting lead of two ounces by the irruption of the air into a cylinder, out of which it had been exhausted by his air-pump: which succeeded very well, the lead being cast with a considerable force. He also gave a paper of the same\*.

March 10, at a meeting of the COUNCIL were present,

Mr. PEPYS President

Lord VAUGHAN

Sir JOSEPH WILLIAMSON

Sir JOHN HOSKINS

Mr. EVELYN

Dr. GALE

Mr. HENSHAW

Mr. HILL

Mr. PERRY.

\* Letter-book, vol. ii. p. 1

\* Register, vol. vi. p. 302.

Mr.

Mr. HILL gave in a paper, containing some amendments and additions to be made in the plates of the *History of Fishes*, sent from Mr. RAY : And it was ordered, that Mr. HALLEY inspect the correction of the plates to be amended by Mr. HUNT.

Mr. HENSHAW moved, that the president would desire Dr. LISTER, Dr. ROBINSON, Mr. ASTON, and those of the committee appointed by the Society on the 25th of March 1685 to manage the affair of printing the *History of Fishes*, to give him a meeting at Gresham-college, to confer with him and the council about what had been done in the matter referred to them : which was accordingly ordered for the Wednesday following, March 17, at eleven o'clock in the morning.

It was ordered, that the journal and register books of the Society be consulted upon the eighteen heads this day concluded upon as to their relation to use, and particularly navigation.

It being again desired of Mr. HOOKE to give in his scheme of a method for his experiments, he requested, that the Society would nominate a subject for experiments to be made by him ; but that they would leave him to his own method of prosecuting them. Whereupon the council desired him to proceed upon which of the said eighteen heads applicable to navigation he should think fit ; and ordered him to have a copy thereof.

At a meeting of the SOCIETY on the same, Sir JOSEPH WILLIAMSON, vice-president in the chair :

The minutes of the last meeting were read.

Mr. ASTON gave in the root mentioned by Monsr. JUSTEL, which tinges oil red. It was judged to be only some small fibres of alkennet root known to have that effect ; and a piece thereof produced by Mr. HALLEY tinged the grease of the candle of a lively red, the tincture being communicated from the bark of the root.

Upon search of the register book of the Society, it appeared, that Mr. HOOKE's way of carrying air under water for the use of divers by a chain of buckets inverted, brought in by him in the year 1663, was not entered there,

A part of Mr. LEEWENHOECK's letter was read, containing his observations upon gall and the scales, and slime of the eel and the bream ; which slime, he said, he had discovered to be parts of the body of the fish, and to consist of a great number of vessels interwoven together ; describing the manner how these vessels came out of the scales, that lie under it. The rest of the letter was referred to another meeting.

A paper of Mr. WORLIDGE of Petersfield in Hampshire, brought in by Mr. Houghton, concerning the original of springs, was in part read ; wherein he endeavoured to shew the absurdity of the opinions of those, that derive springs from rains

rains and dissolved snows; as likewise of that, which deduces their origin from a filtration or a percolation of the sea-water; substituting in their places a vapour arising through the porous spongy parts of the earth, and condensed near the superficies thereof into water. The paper being long was referred to the perusal of Dr. SLARE, who was desired to give an account thereof.

This occasioned much discourse concerning the cause of fountains; and Dr. ROBINSON was of opinion, that the streams raised by a subterraneous heat, either of fire or a fermentation within the bowels of the earth, was the most probable cause of springs; which yet was opposed by some others of the members.

Mr. HOOKE remarked, that the stone called brass lumps or pyrites would catch fire by moisture; and that a heap of coals was by this means fired at Charing stairs.

The lord VAUGHAN said, that there was a well in Caermarthenshire, that ebbs and flows; of which he promised a farther account.

Mr. HOOKE having made several observations on the temperature of the air at above 300 feet deep in a well on Banstead downs in 1665, it was ordered to see what account there was of that experiment in the books of the Society.

Sir ROBERT GOURDON said, that there was a lake in Scotland called Loch-Nefs, and a river of the same name, that never froze, but was so warm, as to melt ice, if put into it.

The notes of Mons. JUSTEL were read, concerning an engine, that consumes smoke, and prevents all sorts of the most foetid things cast into the fire from being offensive; were read: as likewise a paper about steel soles for shoes, made very light, and yet preserving the feet from suffering by the inequality of the pavement, and sharpness of the stones. One of these notes gave also an account of a very large and extraordinarily fine paper made in France, worth fifteen crowns a quire.

It was ordered, that the experiment for consuming smoke be tried before the Society.

Mr. HOOKE brought in his account of the manner of setting a small instrument perpendicular; but it being late, the reading of it was referred to the next meeting.

Mr. WALLER presented three sticks of Indian lac for sealing.

Dr. PAPIN shewed a further experiment of shooting by means of a cylinder evacuated of air, being much longer than the former: But the effect was not sensibly more considerable than in the shorter cylinder.

<sup>1</sup> Register, vol. vi. p. 303. It is printed in the *Philosoph. Trans.* N° 181. p. 73, for May 1666.

He likewise gave in a paper concerning this experiment<sup>1</sup>; and produced some plumbs preserved by him in his jelly of bones, which were very good.

March 17, at a meeting of the COUNCIL were present,

Mr. PEPYS President,

Lord VAUGHAN

Dr. GALE

Sir JOSEPH WILLIAMSON

Dr. LISTER

Sir RICHARD BULKELEY

Dr. ROBINSON

Mr. HILL

Mr. ASTON

Mr. HENSHAW

Mr. PERRY

Mr. EVELYN

Mr. HAYNES

Mr. HERBERT

Mr. FLAMSTEAD.

Dr. LISTER at the desire of the council declared, that the order for printing no more than 500 copies of the *History of Fibres* was given by the direction of the committee, to whom that business was referred. He said likewise, that it was himself, who had brought the plates, and agreed for the price of engraving.

As to the paper, Mr. ASTON declared, that he brought one Mr. MILLS, a stationer, to Mr. HILL, who promised, that he should be paid for the paper of the book, it being to be the same paper with that, on which Dr. PLOT's *History of Staffordshire* was printed, and to be afforded at seven shillings a ream. But that that parcel of paper not holding out, it had been supplied with a better sort; for which the said stationer was to have eight shillings and six-pence a ream.

The council being of opinion, that it was high time, that the money due for the paper, printing, and other charges of the said book should be paid, ordered, that the committee appointed on the 13th of January preceding for auditing the treasurer's accounts should meet on the Wednesday following before eleven o'clock in the morning, and make a report of the state of the Society's cash to the council then to sit.

At a meeting of the SOCIETY on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

The minutes of the last meeting were read.

Dr. SLARE brought in an abstract of Mr. WORLIDGE's paper about the original of fountains, which had been in part read the day before in the meeting of the Society, and gave an account of his hypothesis of the cause of rains and snows, and of the tides by an attractive influence supposed by him in the sun and moon.

Two notes of Mons. JUSTEL were read, giving a farther account of the engine, that consumes smoke, and that incense burnt therein gives no smell at all.

<sup>1</sup> Register, vol. vi. p. 354.

In one of these notes he sent the title of a book, called, *Critica historico-chronologica in annales ecclesiasticos eminentissimi Card. BARONII, auctore ANTONIO PAGI*; who pretends to have found out a period, which he names *Periodus Græco-Romana*, more useful and better than the Julian period.

Mr. HOOKE shewed his demonstration of his manner of setting a small instrument perpendicular, and was again desired to bring in an account thereof in writing at the next meeting, with its application.

Dr. PAPIN brought in a paper about a way of firing gun-powder and the like *in vacuo* without the gun; but it being late, this paper with the experiment was referred to the next meeting.

Some part of Mr. LEEWENHOEK's letter, that had not been read in the Society, was ordered to be read at the next meeting.

March 24, at a meeting of the COUNCIL were present,

Mr. PEPYS President

Lord VAUGHAN  
Sir JOSEPH WILLIAMSON  
Sir RICHARD BULKELY  
Mr. HILL

Mr. HERBERT  
Dr. GALE  
Mr. MEREDITH  
Mr. PERRY.

It was ordered, that the committee of the Society appointed March 25, 1685, to manage the affairs of printing the *History of Fishes* be revived; and that they be desired to proceed to do what shall be by them thought expedient to perfect the whole matter: And that Mr. HILL the treasurer pay the sum of fifty-three pounds to the order of the committee for the said book, the same being upon account for the printing and other charges appertaining to the finishing of the said book.

At a meeting of the SOCIETY on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

Mr. HOOKE was of opinion, that the engine, which is said to consume smoke, contained in it the fire of spirit of wine, or oil of turpentine, or the like: which flame concealed in the cavity of the engine, and drawing its air by the hearth or furnace, the smoke of any thing, that was laid on the furnace, was thereby carried inwards to the flame of the burning liquor, which consumed it, or at least it dissipated its parts, so as it was no farther sensible.

A note from Mons. JUSTEL was read concerning a plant, whose flower yields a very inflammable sulphur, which was the *pulvis fulminans*, mentioned in one of his last; but that it must be gathered in a critical time, by reason that the sun dissolves it; and that it was believed, that the same might be had from juniper in the spring time. He mentioned likewise several very curious draughts of the cities of China, which draughts were to be seen in Holland.

O o o 2

Mr.

Mr. HILL remarked, that he had read, as he thought, in the *Philosophical Transactions* an account of a feed in Denmark, that would catch fire very easily.

A letter of Mr. ST. GEORGE ASH, written by order of the Dublin Society, and dated at Trinity-college, Dublin, March 13, 1683<sup>a</sup>, was read, wherein they desired to continue their correspondence with the Royal Society, and promised to send an account of several curiosities then before them; and mentioned particularly a girl of eleven years of age, prodigiously skilful in most parts of Mathematics, having been examined before the Dublin Society with severity enough in Arithmetic, Algebra, Geometry, Trigonometry, Astronomy, Chronology, speculative Music, and Mechanics, in all which she answered with great readiness and judgment.

It was ordered, that this letter be answered, that the Society readily accepted the offer of correspondence, and desired Mr. Ash's communications; and that he and Mr. WILLIAM MOLYNEUX be informed of their having been elected members of the Royal Society.

A paper of Sir WILLIAM PETTY, containing his thoughts of the several parts, that ought to compose a complete treatise of navigation, <sup>1</sup> was read.

Mr. AUBREY gave an account, that there was a set of draughts of six sheets, representing the manner of several sea-fights, done by Mr. HOLLAR. It was ordered, that they be procured for the Society.

Mr. LODWICK was desired to translate a letter of Mr. LEEWENHOECK's, containing his microscopical observations upon cinnabar and gun-powder.

Mr. HOOKE, at the desire of the council, brought in an analysis of the whole matter of hydrography, of which he had given a fair copy to the president, and promised to give another to the Society.

Dr. GALE remarked, that the Romans never used either pitch or tar in their shipping, but wax.

Mr. HOOKE observed, that he remembered to have read somewhere, that they mixed with their wax the dregs of oil called *amurca*; but that he could not at that time recollect his author.

Dr. GALE said, that the invention of tar was of no great antiquity; and that there was no Latin word for it; but that MICHAEL PSELLUS, a Greek author, mentioned it about 1000 years before.

Mr. HOOKE farther illustrated his contrivance for setting a small instrument perpendicular. He was desired to procure his instrument to be made for the use of the Society.

<sup>a</sup> Letter-book, vol. x. p. 287. <sup>1</sup> Printed in the *Philosoph. Transl.* N<sup>o</sup> 19<sup>o</sup>, p. 657. for March 1693.

A letter of Dr. REISELIUS to Mr. ASTON, dated at Stutgard, February 12, 168 $\frac{1}{2}$ <sup>a</sup>, was produced and ordered to be read at the next meeting.

Dr. PAPIN's experiment of firing gun-powder *in vacuo*, and concluding the quantity of air made by the blast, was referred to be shewn at the beginning of the next meeting.

1686. March 31, Sir CYRIL WYCHE vice-president in the chair.

Upon occasion of Mr. WORLIDGE's opinion of the cause of fountains, Mr. HENSHAW thought, that the generation of metals could not well be accounted for without allowing the hypothesis of a central fire.

It was ordered, that a farther inquiry be made of Monsi. JUSTEL about the sulphur of the plant mentioned in his last note to be a native pulvis fulminans.

Mr. HENSHAW remarked, that he had formerly presented the Society with a sort of sea-weed brought from Iceland, whose moisture, as it exhales, shoots into a sweet substance resembling sugar; which therefore he called *alga saccharifera*.

Mr. AUBREY gave an account, that Sir JONAS MOORE had caused several curious observations about the time and heights of the tides at London-bridge to be made by means of a rod buoyed up at the bottom by cork, and so rising and falling with the water: which observations Mr. AUBREY conceived might be in the custody of Mr. FLAMSTEAD, or captain HANWAY, son-in-law of Sir JONAS MOORE. He was desired to do his endeavour to procure the sight of them for the Society.

He mentioned, that the greatest tide found on the coast of England is at Chesham-bridge; and he moved, that Sir JOHN HOSKYNs might be desired to inquire into the circumstances of the tide at that place.

It was ordered, that the president should be desired to obtain from capt. COLINS, who was then engaged in the survey of the sea-coast of England, a communication of his observations of the tides in the several ports, and especially the head-lands.

Mr. HENSHAW remarked, that tar is the first running of the extract of pitch out of the fir-wood; and that the latter part being boiled makes the stone-pitch; and that the description of the manner of making it, and its use in shipping, is in PLINY, who calls it *pix liquida*, lib. 16. cap. 11.

Mr. HOUGHTON shewed a part of an animal smelling strong of musk, and said by the owner thereof to be a musk-cod. It was cut in two places, and seemed to have within it two cavities, as if the testicles had been quite dried up.

<sup>a</sup> Letter-book, vol. x. p. 288.

Mr. HILL said, that it was an usual fraud to tie up parts of the skin of the musk-deer, all which smell of musk, into the likeness of cods; but that in fact it was not the testicles of that animal, that yield the scent, but a gland growing under the belly.

Dr. PAPIN shewed his experiment of firing gun-powder *in vacuo*; but it not succeeding by reason of some soot got in with the powder, it was ordered to be tried again at the next meeting.

Mr. HOOKE gave an account of his firing gun-powder *in vacuo* with a burning-glass; and said, that now and then a single corn would go off upon the whole heap without kindling the next corn; and that at length having melted the heap into a lump, it went off after the manner of the pulvis fulminans with a very great report, and burst his glass into a thousand pieces, and stuck great part thereof into the cisleng.

Part of a letter of Mr. LEEWENHOECK was read, containing several curious observations on cinnabar and gun-powder; and mentioning an experiment, proving the expansion of gun-powder to be into a space above 2000 times greater than the space, which it takes up before fired; for that a grain weight of powder containing 13 corns takes up as much room, when fired, as 2080 grains of water.

Three papers of Dr. PAPIN were read relating to his experiment of firing gun-powder *in vacuo*; in one whereof he said, that by the experiment made after the last meeting was over, he found, that 9 grains of gun-powder produces as much air, as fills the space of a third part of a pound of water; from whence he concluded, that 9 grains of powder yields  $2\frac{1}{3}$  grains of air; and from hence it would follow, that each grain gives but  $2\frac{1}{3}$  times as much air as its own bulk; which is far short of Mr. LEEWENHOECK's experiment.

N. B. That air being but about  $\frac{1}{12}$  of the weight of water, which is near the weight of gun-powder, a grain of gun-powder, if it should be turned into air, could take up but 800 times as much space as its own bulk. Wherefore either the observation of Mr. LEEWENHOECK is faulty; or else the air produced by the explosion of gun-powder has a greater elasticity than the common air in a lighter body.

Mr. HENSHAW was of opinion, that the constituent parts of the air are no other than the steams and exhalations out of the earth.

Mr. HALLEY brought in two shells or substances resembling small beaks of birds found in ambergrise.

Mr. HOOKE thought them to be the shells of some such insects, as the scarabæus nasicornis.

\* Letter-book, vol. xi. p. 15.

Mr. HENSHAW was rather of opinion, that they might be the skins of some sort of *juncus Indicus*.

Mr. WALLER shewed another scheme of colours, wherein by the mixtures of the several blacks and yellows (which, he said, were principal colours) he had produced a series or shade of most colours imaginable.

A letter of Dr. REISELIUS to Mr. ASTON, produced at the last meeting, was now read, giving a relation of a Chalcedonian stone, the substance of which was clear, and of an onyx or horn-colour; but which, by the casual laying of pulvis fulminans mixed with a red glass prepared for fusion thereon, had imbibed the colour of the mixture after a very odd manner, as Dr. REISELIUS shewed in a figure annexed\*.

It was ordered, that a pole for erecting a telescope in Gresham college be set up, and that the treasurer pay thirty shillings for the charges of it.

April 7, 1686. Mr. HENSHAW was desired to take the chair.

Upon the mention of the musk-cod produced by Mr. HOUGHTON at the last meeting, Dr. TYSON remarked, that having kept the cod or scent-bag by the anus of a weasel for some time, it afforded a kind of a musk-smell; but that at first it had a very offensive smell.

Mr. HILL produced a paper transcribed from the memoirs of the Duke of Sully concerning the firing of gun-powder, after it had lain sixteen years in the flesh of a man. The paper was read.

Dr. TYSON shewed a figure of a fish of the *acus marinus* kind curiously drawn by Mr. WALLER, which was anatomised and described by himself. The fish and figure were left with Mr. HUNT for the repository.

Dr. TYSON shewed likewise a stone taken out of the kidney of a man, which was very rough and radiated or pointed every way like an echinus, and very hard. The body of the stone in the middle was about the bigness of a large pea; and as radiated it would fill a small hazle nut-shell.

A note of Dr. PAPIN concerning the firing of gun-powder *in vacuo* was read.

Mr. HILL read a passage concerning the circulation of the blood extracted from a book of MICHAEL SERVETUS\*, printed in the year 1553.

It was ordered, that the journal-book be produced and examined concerning the experiments made to prove the arterial blood made in the lungs.

April 14, Sir CYRIL WYCHE vice-president in the chair.

\* This account is printed in the *Philos. Transf.* vol. 16. N°. 179. p. 22. for Jan. and Feb. 1686.

\* His *Christianissimæ refutationis*.

The minutes of the last meeting were read.

Two notes of Monf. JUSTEL were read; the first giving an account of a sort of salt, with which drowned puppies had been in a short time brought to life; promising to get some of this salt for the Society to make the experiment with. This note likewise gave an account of the French King's statue erected by the Marshal DE LA FEUILLE.

The other note mentioned a scarlet tincture drawn from gum lacca to be better and cheaper than that of cochineal, and not so apt to change; as also a statuary, who had made a marble head for an antique statue of APOLLO, that wanted an head; which he had done to admiration, and was but five days about it: that all the sculptors would not believe it, unless he had some secret for softening marble, or tools, that would do more execution.

A paper of Dr. PAPIN was read concerning boiling of sago and making of chocolate *in vacuo*, to be compared with the same done in the air. The experiment was ordered to be got ready against the end of the meeting.

Sir EDMUND KING said, that chocolate would not bear boiling, but must be made with a moderate heat; and that he found, that an egg to every fourteen spoonfuls of water was the best proportion.

The Lord VAUGHAN affirmed, that the Spanish chocolate was without eggs, and yet that it froths better than that made with eggs.

Mr. HALLEY read an account of an experiment made by himself to find the comparative weight of quicksilver to water by weighing a quart of quicksilver in water. This paper was ordered to be registered as follows:

" Having formerly made trial in a small quantity of mercury, and having found, that the weight of mercury to water was not fifteen times, as Sir JONAS MOORE hath it, nor yet fourteen, as it is commonly accounted, but rather less than thirteen and an half; I was resolved to make trial with a greater quantity of mercury, and accordingly I did it with a whole quart, the method this:

	lb	3	3
" I took a quart bottle full of mercury, and in air it weighed	32	00	4
" The same in water weighed	28	13	2
" Difference, the weight of the whole bulk in water	3	2	7
" Weight of the bottle in air was	2	7	2
" Hence the weight of the mercury was	29	8	7
" Weight of the bottle in water	1	8	3
<hr/>			
" Weight of the bulk of the bottle in water	0	14	7
" Weight of the bulk of mercury in water	2	4	0
" Weight of the mercury as before	29	8	7

Register, vol. vi. p. 310. In the margin is a note, that there being some error in the weights, care must be had to repeat them.

" That

" That is, as 3783 drams to 288 drams; that is as  $13\frac{1}{2}$  *ferè*, which I take to be very near the true proportion of these two liquors; for the scales were very good, and would turn with a small part of a dram, when charged with the 30 *lb.* weight.

" From this proportion it should follow, that if the weight of air be to water as 1 to 800, that 10514 inches or 876 feet of air should counterpoise an inch of quicksilver, and that at that height the quicksilver in the barometer ought to sink an inch. The which is found to answer nearly to the experiments made on the tops of hills; for the accounts of that made at the Py de Domme in Auvergne is, that in 500 toise or 3000 foot high the mercury subsided  $3\frac{1}{2}$  inches, and Mr. CASWELL on the top of Snowdon hill in Carnarvanshire found, that in the height of 1250 yards, there was completely 4 inches difference: and though these accounts make above 900 foot to an inch, yet the rarefaction of the air above, in respect of that below being allowed for, the weight of the air in respect of water will be found very near the 800th part, as it has been experimented before the Society by weight in an exhausted Florence flask, query the day."

Mr. HOOKE shewed an experiment for finding the same thing by a syphon filled with mercury in the one shank and water in the other. The water was observed  $79\frac{1}{2}$  inches above the mercury, which was counterpoised by  $5\frac{1}{2}$  inches of mercury standing above the section of water and mercury in the other shank, whence the proportion of their gravities is as 47 to 635, or as 1 to  $13\frac{1}{2}$ .

A note of Dr. GALE was read, containing the opinion of HUETIUS\*, that the original of cyphers was rather from the Greeks than the Arabians or Indians; and mentioning a manuscript copy of MARCIANUS HERACLIOTA the geographer, made use of by DAVID HÖRSCHELIUS in his edition of MARCIANUS, in which manuscript were some cyphers seeming to confirm HUETIUS's opinion†.

Sir CYRIL WYCHE remarked, that it was plain from VARRO, that the Romans used to express all numbers by ten marks, as we do now by our cyphers; and he promised to produce the passage.

Monf. JUSTEL presented a book of Monf. MARIOTTE concerning the motion of water, &c.

Dr. PAPIN's experiment of sago and chocolate boiled *in vacuo* and in air was shewn; as it appeared, that the sago boiled *in vacuo* was much softer and tenderer than that boiled in air; but that there was very little or no difference in the chocolate, except that there was a kind of empyreuma in that made *in vacuo*, which was not in the other.

A letter of Mr. LEEUWENHOECK, dated April 2, 1686, N. S. being an answer to one sent him dated March 2, O. S. and giving an account, among other things,

\* In his *Demonstratio Evangelica*.

† Register, vol. vi. p. 308.

of the texture of bone viewed in a microscope, was produced, and ordered to be translated.

April 21, at a meeting of the COUNCIL were present

Lord Vaughan	Sir CYRIL WYCHE vice-president,
Dr. GALE	Mr. PERRY
Mr. HAYNES	Mr. COLWALL
Mr. HILL	Dr. ROBINSON
Mr. HENSHAW	Mr. ASTON.

Two reports were read from the committee of the Society concerning the state of the account of the *History of Fibres*; the substance whereof was,

	<i>l.</i>	<i>s.</i>	<i>d.</i>
That there had been paid for engraving the plates, &c. ———	232	11	7
By an account allowed Dr. PLOT ———	3	7	8
By an account allowed Mr. ASTON ———	11	0	0
More to Mr. PAULET ———	51	16	6
More to Mr. HILLS ———	3	0	0
More to Mr. CLERK ———	6	6	6
Remains to be paid to Mr. HILLS, stationer, ———	42	15	0
To Mr. HUNT for engraving and designing, if the council shall think fit ———	7	10	0
The several incidental charges ———	1	12	9
Total of the charge —	360	0	0

And supposing the number of the books designed 500 to be but 480 compleat, they will stand the Society in fifteen shillings each book, which they propose as a price for all such persons, as have given a plate to the book.

All other persons, who are or are not of the Society, and who gave no plate to the book, to pay twenty shillings.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Besides which the printing a sett of figures upon paper of fifteen shillings <i>per</i> ream amounts to ———	0	5	8
Upon a better sort at twenty two shillings <i>per</i> ream ———	0	8	0
So that to a benefactor the whole book will be in the worst paper —	1	0	0
In the best paper ———	1	3	0
To the rest in the worst paper ———	1	5	0
In the best paper ———	1	8	0

Likewise that Mr. HUNT for his encouragement to look after the printing the figures may be allowed to take six-pence more for each book of the buyer, provided there be nothing demanded of the the treasurer.

The

The council then agreed with the committee as to the price, and ordered, that Mr HUNT should deliver the books at the rates above written, viz. to benefactors at fifteen shillings per book, and to all others at twenty shillings per book, and besides to take six-pence more of the buyer upon each book for himself.

It was ordered, that the bill of Mr. HILLS the stationer be examined by the committee; and that the treasurer pay what they shall think due to him:

That Mr. RAY be presented with twenty copies of the *History of Fishes* unbound; and that Dr GALE be desired to signify the same to him, and to return him the thanks of the Society for his trouble and care:

That Dr. LISTER, Dr. ROBINSON, and Mr. ASTON, who have been principally concerned in the affair of printing the *History of Fishes*, have the thanks of the Society for their pains and trouble in that matter: and

That Dr. PAPIN be paid the sum of seven pounds ten shillings, being for the salary due at Lady-day past.

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE vice-president in the chair.

The minutes of the last meeting were read.

Sir CYRIL WYCHE obliged the Society with an account of the Roman abacus and its uses; and produced the passage in VARRO proving the numeration of the old Romans to be after the same manner that we now use in counting by our cyphers; concluding his discourse with an accurate description of the Roman manner of counting by the part of an *as*, by *denarii* and *sestertii*, together with tables of their values in our monies.

A letter from Mr. WILLIAM MOLYNEUX to Mr. HALLEY, dated at Dublin, April 8, 1686, was read, as follows:

" Sir, I do with much willingness and joy accept of your correspondence, which  
 " you have so kindly proffered me in yours of March the 27th. I must acknow-  
 " ledge it had been my part, to have prevented you in this particular, and to  
 " have made the request first to you; but I had heard of the late disturbances in  
 " the Royal Society, and was unwilling to trouble you till matters were settled.  
 " But now I must needs express my satisfaction in the accommodation of affairs,  
 " and that the Society has taken the course they are in; for indeed I always look-  
 " ed upon it as a defect in their constitution, that their secretaries, or he that  
 " managed their correspondence, was annually elective, and also left without an  
 " established salary, that might encourage, and recompence him for his trouble.  
 " His annual election is inconvenient, because upon every renewal of the secretary  
 " the correspondence falls of course, and without a considerable salary no man  
 " can spend his whole time (for it requires *totum hominem*) in receiving and writ-

<sup>1</sup> Letter-book, vol. x. p. 292. Mr. HALLEY in his letter, Supplement to letter-book, vol. iv. p. 379. to which this of Mr. MOLYNEUX is

an answer, mentioned, that Mr. ASTON and Dr. ROBINSON had *without any apparent cause* resigned their office of secretaries.

P p p 2

" ing

ing letters, and managing the registers with other troublesome work. I hope the Society will consider this for the future, and so establish this affair, that hereafter they may not be at such a loss, as they have been. And now, Sir, I must congratulate you upon your being settled in the place you have; I know no man more fit for it than yourself: but then as a friend you must give me leave to advise you to diligence, for truly I think you have a considerable duty to discharge. I thank you for the account you give me of the affairs of the Society: I had it before, but it was from a person concerned, whom I always thought to blame in this particular; for I found thereby, there was a party arising in the Society, that were for rejecting all kinds of useful knowledge except ranking and filing of shells, insects, fishes, birds, &c. under their several species and classes; and this they termed *Natural History*, and *Investigating Nature*, never attending to the uses and properties of these things for the advantage of mankind, and reckoning chemistry, astronomy, mathematics, and mechanics, as rubs in their course after nature. This indeed seemed to me something strange; and I must confess, I could not but laugh at it. I return my humble thanks to the Royal Society for the honour of admitting me into their company. Pray, Sir, be pleased to let me know my debt to the treasurer, and I shall take care to see it timely discharged. I must also thank you for your philosophical communications, and your kind promise of the continuance of them. I wish I may in any wise be able to make you suitable returns, but that I must despair of, yet I promise you, that nothing shall happen here worth your notice, which I shall not timely communicate. I must confess, we have been lately something idle, and several of our meetings have been employed by a young mathematical female in this place, bred up by one Mr. TOLLET, a teacher of mathematics, and a most excellently learned man in that kind. The child is not yet eleven, and yet she hath given us sufficient proofs of her learning in arithmetic the most obtruse parts, algebra, geometry, trigonometry plain and spherical, the doctrine of the globes, chronology, and on the violin plays any thing almost at sight. As this is a most plain instance of the force and power of timely education, and of the reach, that man has naturally, we have thought it worth our while to consider and examine it thoroughly; and indeed we find, at least that the child seems to have no more natural inclination or delight in these things than ordinarily amongst children. But I suppose our secretary, Mr. ASHE, may give you a more particular account of this matter, and therefore I shall say no more concerning it.

“ Mr. HOOKE’s contrivance for the baroscope is admirably curious. I suppose what you mention as Mons. HUBIN’s invention is rather Mons. HUGENS’s invention, and described in the *Journal des Sçavans du Lundi 12 Decembre 1672*. But Mr. HOOKE’s goes beyond it in many respects: the only difficulty of Mr. HOOKE’s is in the fabric of the glass, and filling it with mercury; and if he have any mechanical easy contrivance for doing this, he would do well to publish it. I thank you for the promise you make me of his small, yet accurate level. Indeed I have always had a great esteem of his mechanical inventions, of which I look upon him to be as great a master as any in the world; and that is a most curious part of philosophy, and really useful in man’s life. And whereas, I

“ under-

" understand, that a chance word in an idle scribble of mine was something displeasing to that ingenious and learned gentleman, I desire he may be informed, that I designed no manner of slight by the word *pamphlet*, but stiled his book so, merely as I thought it a name usually given to small stitched volumes.

" As to the controversy with Monf. HEVELIUS about telescopic sights, I can say no more than what I have formerly writ : only I will add two things ; first, that I humbly conceive Monf. HEVELIUS did not, nor does he yet rightly, apprehend the manner of those sights performance : this I presume to collect from these words in his Math. Coelest. part. primâ, pag. 296. *Ceterum cum acus vel fila adeo prope lentem ocularem ad observatoris oculum vix in remotione aliquot digitorum subsistant, dubito an dioptra hęc, oculo tam propinqua, multò accuratius stellas quasvis minimas, quam pinnuridia nostra, ad sex novemve pedes ad invicem remota, possit detegere.* By which 'tis manifest, that he makes his great and chief objection against these sights on the account of the nighness of the eye and cross-hairs, imagining, that the line of collimation (if I may so call it) in these sights is no longer than between the eye and cross-hairs ; whereas all, that understand these kind of sights, must needs know, that the line of collimation is as long as between the object-glass and cross-hairs. And on this account 'tis, that I presume to think the old gentleman did not understand these kind of sights ; and that Mr. Hooke had sufficiently convinced him of his error in rejecting them by explaining to him their manner of performance, and nothing more.

" The other thing I have to add is, that I esteem it most disingenuously done of HEVELIUS, in relating the trials between you and him, to call your instrument every where a sextans. I acknowledge, had I known this before I writ my letter to Mr. ASTON, I should hardly have put pen to paper. And I have lately been desired by the Society at Oxford to translate that letter into Latin for Monf. HEVELIUS's reading : I was obedient to their demand, but I have added a postscript to it, wherein I do not well approve of his calling a quadrant of less than two feet radius a sextans, and speaking of it as of a large and considerable instrument.

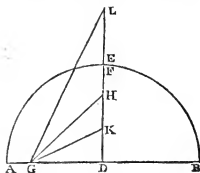
" The contrivance of Monf. JUSTEL's furnace, that consumes smোক, will be very acceptable ; pray, when you receive it, let not us want it.

" I have by this post sent to my brother a paper, that relates to a problem in hydrostatics, why heavy bodies dissolved in a menstruum specifically lighter than themselves swim therein, and do not sink to the bottom. Concerning this my brother has proposed his thoughts in the *Nouvelles de la Republique des Lettres* ; but I take the liberty of differing from him in some particulars : if you think it worth your perusal, the penny-post will bring it to you from him at Mr. TALSUK, apothecary, at the Dragon in the New Palace-yard, Westminster.

" You

" You may have heard of a girl in this town strangely overgrown with horny excrescences vastly numerous, and very large : my next shall bring you the sketches of her, as well as my rude hand can draw them.

" You may remember, when I was last with you in London, you obliged me with your rule for shooting on ascents and descents with the mortar-piece. The proposition is ; the greatest random of a piece, the horizontal distance of an object, and the height or descent from the horizontal line, being given, to find the two elevations, or depression of the piece necessary to strike the given object. Your construction is this. In the figure make  $AD$  = greatest rand :  $DB = AD$  + double hight descent strike the semicircle  $AEB$ , erect the perpendicular  $ED$ , make  $DG$  = the horizontal distance, and  $GH = ED$ , and  $DF = AD$  the greatest rand. Then make  $FK$   $FL$  each equal to  $HG$  ; draw  $KG$   $LG$  the angles  $KGD$ ,  $LGD$  are the elevations required ; and if  $K$  fall below  $D$ ,  $KGD$  shall be the depression.



" This is your construction ; and thereon you have a rule, divide the greatest random by the horizontal distance ; but I need not repeat it to you, you have it in your pocket-book. I must beg the favour of you to give me your demonstration of this rule and construction. You promised it to me, when I was with you, but my departure was so sudden, I had not time to put you in mind thereof. The gentleman I mentioned to you just now, Mr. TOLLET, upon seeing your diagram, gave me this short rule for shooting on ascents : From the greatest random subtract double the hight, multiply the remainder by the greatest random from the product subtract the square of the horizontal distance ; the square root of the remainder added to the greatest random, and subtracted from it will give two perpendiculars : the base to each is the horizontal distance, and the angles at the base will be the elevations required. 'Tis manifest, that this rule is drawn from your figure, but I confess, I have not the demonstration ; but your demonstration I am sure will bear it, and therefore I must desire you not to detain it from me longer than your next to me. Doubtless you have seen Monf. BLONDEL'S *Art de Jetter les Bombs*, a book wherein there is nothing material more than what was before him in GALILEO \* \* \*, except only this business of shooting on ascents and descents : after he had proposed the problem to Messieurs DE L'ACADEMIE ROYALE DES SCIENCES, Monf. BUOT, Monf. ROMER, Monf. DE LA HIRE, and Monf. CASSINI employed their thoughts about it ; but I can assure you upon rigid examination, there is not one of their rules holds true in all cases.

" I think

" I think I have sufficiently tired you for the first time. I am

" your most humble servant,

" WILLIAM MOLYNEUX."

Part of a letter of Mr. LEEWENHOECK was read, wherein he described the particles composing cinnabar, shewing them to be made up mostly of hexagonal figures, yet not without the mixture of some sulphureous and saline particles, whose figures, as viewed in his microscope, he described.

Dr. PAPIN gave in a description of an improvement of his new digester for distillation *in vacuo*<sup>b</sup>, which he said he would produce before the Society at their next meeting.

Mr. HALLEY read a discourse of his own, designed for a *Philosophical Transaction*<sup>c</sup>, concerning the cause and properties of gravity, wherein he considers the several hypotheses concerning its impulses, and then mathematically deduces its consequences in the fall of heavy bodies, and the motion of projects.

Dr. SLARE produced a letter from JOHN WEICHARD VALVASOR to the Society from Carniola, which was ordered to be read at the next meeting.

Mr. HOOKE shewed the experiment of the æquilibrium of water and oil of turpentine in an inverted syphon, as he had done before of mercury and water; and it appeared, that  $92\frac{1}{4}$  of water was equal in weight to  $107\frac{1}{4}$  inches of oil of turpentine; whence the weight of water to that of oil of turpentine is as 1719 to 1487, or as 1 to 0,865. Hence the weight of mercury to oil of turpentine is as 15 to 62 or as 4 to 1.

April 28. Sir JOHN HOSKYNs was desired to take the chair.

The minutes of the last meeting were read.

Two notes of Monf. JUSTEL were read, the one giving an account of the Chinese chess-board and the manner of their play; and mentioning a late *Journal des Sçavans*, wherein there is an account of the discovery of two new satellites of Saturn by Monf. CASSINI, so that there were five of them.

Part of a letter from Mr. LEEWENHOECK was read, containing his observations upon the figure of the parts of the nitre after the explosion of the gun-powder; with several curious remarks about the manner of firing gun-powder, about the quantity of air produced by the blast, and about the length of a cannon to carry farthest.

Dr. VINCENT presented to the Society a manuscript treatise intitled, *Philosophiæ Naturalis principia mathematica*, and dedicated to the Society by Mr. ISAAC NEW-

<sup>b</sup> Register, vol. vi. p. 311.

<sup>c</sup> It is published in the *Philos. Transact.* N°. 179. p. 3.

TON, wherein he gives a mathematical demonstration of the Copernican hypothesis as proposed by KEPLER, and makes out all the phenomena of the celestial motions by the only supposition of a gravitation towards the center of the sun decreasing as the squares of the distances therefrom reciprocally.

It was ordered, that a letter of thanks be written to Mr. NEWTON; and that the printing of his book be referred to the consideration of the council; and that in the mean time the book be put into the hands of Mr. HALLEY, to make a report thereof to the council.

Dr. PAPIN gave in a paper concerning his method of distilling *in vacuo*, which upon trial was found to succeed very well, and was judged to distill faster than in air.

MONSIEUR MARIOTTE'S *Du Mouvement des Eaux* was produced bound, and put into the hands of Mr. HALLEY to make an extract thereof, and report it to the Society.

Mr. WALLER shewed a contrivance for printing of colours upon the table, which he designed to publish, being a catalogue of all simple and mixt colours. It was by small taper pipes, which at the small end were stopp'd by plugs thrust on by spiral springs so as to keep the colours from running out; but when he intended to print, the plugs being thrust back by points standing out of them, the colour came down so as to make convenient round spots on the paper.

Mr. JOHN WEICHARD VALVASOR'S letter, produced at the last meeting, being found to be little else but a copy of the former, which he conceived had miscarried, was let alone.

Mr. HALLEY gave an account of two occultations of Jupiter by the moon<sup>a</sup>, the one observed by Mr. HOOKE and himself in Gresham-college, March 31 last in the evening. The central immersion was found at 9 hours 33 min. the emergence of the first limb of Jupiter at 10 hours 30 min. of the last limb at 10 hours 31½ min. the conjunction being but very little to the northward of the moon's centre.

The other was this day in the morning or April 27, 15 hours 49 min. when Jupiter's centre emerged from behind the moon then just full about 342 deg. of the inner limb of HEVELIUS'S *Selenography*.

A letter in Latin of Dr. SIGISMUND KONIG to the Society, dated at Berne in Switzerland on the last of Feb. 1686<sup>b</sup>, being a continuation of the history of his patient, MARGARET LOWER, who voided stones of a prodigious size, whereof an ac-

<sup>a</sup> This account is printed in the *Philos. Transact.* N°. 181. p. 85. for May 1686.

<sup>b</sup> Letter-book, vol. x. p. 297. It is printed

in the *Philos. Transact.* N°. 181. p. 94. for May 1686.

count was given in the 3d *Philosophical Collection* of Decemb. 10, 1681, was produced and ordered to be read at the next meeting.

He presented with it two of the said stones, one of which was ordered to be put into the hands of Dr. SLARE, who was desired to make what experiments he should judge necessary to examine the composition of its substance.

May 5. Dr. GALE vice-president in the chair.

ANNE TAYLOR, born June 12, 1682, and not yet four years old, being grown prodigiously fat and corpulent for that age, was shewn before the Society. She weighed forty-eight pounds and a half, and was three-fourths of a yard about the waist; her stature not greater than ordinary, viz. two feet five inches. She had a much greater voice than usually such children have, and her breasts and nipples were grown; and by the report of her mother and others she was in her state of puberty: emaciated but three quarters of a year before she was sent to Alesford in Hampshire.

The minutes of the last meeting were read.

Dr. GALE presented to the Society Dr. GOAD's books of his observations on the weather, and the rules for predicting it.

A letter of Mr. RAY to Dr. GALE, dated at Black Notley in Essex May 3 1686<sup>n</sup>, was read, returning thanks to the Society for the 20 copies of Mr. WILUGHBY's *History of Fishes* presented to him.

Part of Dr. KESTO's letter, produced at the last meeting, was read.

A paper of Mr. WILLIAM MOLYNEUX<sup>n</sup>, assigning the reason, why the dissolved particles of metals specifically heavier than the menstua, that dissolve them, do notwithstanding swim therein, to be from the exceeding minuteness of the said particles, supposing, that there is a certain weight necessary to overcome the *viscus*, that is in all fluids, to an union of their parts, so that the bodies, which by their smallness have not so much force or weight to descend with, remain suspended on the pores or interstices between the particles of the fluid menstua: this being an answer to his brother Mr. THOMAS MOLYNEUX about the same thing, who supposed, that the internal motion or agitation of the parts of the liquor, whereby it is made fluid, may be the reason of this appearance.

A paper of Dr. PAPIN was read, giving an account of an improvement of his digester by making it with one single vessel<sup>o</sup>.

<sup>n</sup> Letter-book, vol. x. p. 328.

<sup>o</sup> Register, vol. vi. p. 316. It is printed in the *Philosoph. Transf.* vol. xvi. N<sup>o</sup> 121, p. 28 for

May 1681.

<sup>o</sup> Register, vol. vi. p. 313.

MONS. JUSTEL communicated a *journal des sçavans*, giving an account of the discovery of two new Satellites of Saturn by telescopes of an extraordinary length, some of about 200 feet long. The innermost of those satellites is never above or exceeding  $\frac{1}{2}$  of the length of the ring distant therefrom, and makes its revolution in one degree two hours, 19 minutes. The other is never more than  $\frac{1}{2}$  of the length of the ring distant therefrom, and makes its revolution in two degrees, seventeen hours, forty-three minutes.

MR. WALLER produced his table of colours designed for the *Philosophical Transfusions*.

May 12, Sir JOHN HOSKYNs was desired to take the chair.

Upon mention of Mr. WILLIAM MOLYNEUX's theory of mixing the parts of metals with the menstrua that dissolve them, though by many times lighter than these metals, Mr. HENSHAW was of opinion, that the vapours raised in the air were analogous to the particles of metals rising in dissolving menstrua, and much harder to explicate, there being so great a disproportion in the weight of air and water.

Sir JOHN HOSKYNs mentioned as a probable hypothesis, that aqueous particles should rise in the form of bubbles so thin, that they are very little more ponderous than their bulk of air, and that being agitated by the reflex beams of the sun they are raised to the height we find them: which he illustrated by an observation, which he had made in the iron-works, viz. that an handful of sand being thrown upon the melted iron would immediately by the great heat thereof be cast up to the top or ceiling of the place.

Upon mention of Mr. WALLER's table of colours, Dr. AGLIONBY affirmed, that in painting in fresco no metallic colours are used, they being most proper for oil-painting.

A letter of Mr. ST. GEORGE ASH, dated at Trinity-college, Dublin, April 27, 1686\*, was read, giving an account of his method of demonstrating the 2d and 5th books of EUCLID; of a dog, that was immediately killed by injecting into the jugular vein an infusion of opium in brandy and water; of the mathematical girl at Dublin; as likewise of the opinion of the Dublin Society concerning Mr. HOOKE's level.

A letter of JOHN WEICHARD VALVASOR to Dr. GALE, dated at Laback in Carniola April 1686, N. S.† was read, being an answer to one sent him by Dr. GALE, wherein he informs the Society of several geographical and topographical charts, which he had sent them as a present by way of Venice; of an invention of his to cut a statue six feet high all at once, and so thin, that it should not weigh one pound weight; which invention he promised to communicate to the Society, if desired: Of a treatise, which he had written concerning the curiosities of the lake

\* Letter-book, vol. x. p. 309.

† Ibid. p. 314.

of Zirknits, which he would either print or send to the Society with a dedication to them, or else he would send them his manuscript to be inserted in the *Philosophical Transactions*, if they should think fit. And of a strange tree, which from being bare is full of leaves, and has fruit upon it, all in the eve of St. JOHN's feast-day, therefore called St. John's walnut-tree, which he affirms to have found to be a fact.

This gave occasion of discoursing of uncommon trees, that seem to be preternatural, as the Glasfenbury thorn blossoming at Christmas day, being no other than a common haw-thorn, and the oak in New-forest, which is always green at Christmas, and yet in all other respects is a perfect oak. As to the sudden growth of leaves, Mr. Hooke gave an instance from BAUHIN of the yucca or arbor arborefcens, which in a night will grow or shoot out many feet.

Dr. SIGISMUND KONIG's letter was referred till Dr. SLARE could give his account of the observables in the stone, which was delivered to him to be examined.

Part of a letter of Mr. LEEWENHOECK, being in answer to one written to him March 2, 1684, was read, and the rest referred till another meeting.

Another letter of Mr. LEEWENHOECK was produced, and ordered to be translated.

A note of Mons. JUSTEL was read about a new sort of microscopes made by CAMPANI at Rome with three glasses, and not above three inches long, which were very distinct, but did not magnify so much as the great ones.

The same note mentioned likewise a Dutchman, named MAYER, who had hindered the inundation of the Tiber, and promised a book of very curious subjects in mechanics, to which, it was said, the Italians were then strangers.

Dr. PAPIN shewed the experiment of brewing in his new digester<sup>2</sup>; and it was found, that there was a very strong tincture drawn from the malt in much less time than it could have been done in the ordinary way.

May 19, Sir JOSEPH WILLIAMSON vice-president in the chair.

The minutes of the last meeting were read.

Upon mentioning, that no metallic colours were used in painting in fresco, it was queried about what time the several sorts of painting came to be in use: To which Mr. Hooke answered, that the most antient painting was with gums; then with white of egg; then with wax; and lastly with oil; the particular time of the beginning of each not being easily attainable.

Mr. Hooke read a paper vindicating his level from some objections made against it from Dublin: wherein he supposed, that the pendulum thereof was not

<sup>2</sup> Register, vol. vi. p. 320.

made with the accuracy necessary; and in the end he proposed a further use of that invention by applying the pendulum thereof to the pendulum of a clock, which being capable of being made to vibrate as slow as you please, would make the clock go much slower than ordinarily used, so as to make the time of the winding up but very seldom, with the same number of teeth, which the ordinary clocks have.

The remaining part of Dr. KÖNIG's letter was read about the stones voided by the woman at Berne; wherein he offered his thoughts concerning their generation or concretion.

There was also given in an account given by Dr. SLARE of his examination of the said stones sent to the Society: First, that their specific gravity was much greater than that of all other calculi or topi generated in the body; and that it approached nearly to the weight of other common stones, being more than  $2\frac{1}{2}$  to 1 of the weight of water; which is exactly the gravity of the icicles or incrustations made by the petrification of water in a grotto. Secondly, that he had tried by pouring on of acids upon it, and that the common vinegar made a great ebullition therewith: that spirit of vitriol dissolved it, but would not keep it from precipitating of itself; but that spirit of salt wrought upon it vigorously, presently dissolved it, and kept it from precipitation, the liquor being transparent; but that for want of the volatile and fixed salt, said by Dr. KÖNIG to have been found in those stones, he could not positively affirm it to be an animal substance.

Mr. PIGOT presented a sort of black earth, dug for turf at a place called Hulle near Ormskirk in Lancashire, being a bituminous substance, smelling strong of an aromatic scent, resembling very much that at Hoxton. He produced likewise a bottle of a liquor drawn from it, which, he said, had cured a person of a very dangerous internal bruise.

It was ordered, that signor MALPIGHI, Mr. HEVELIUS, Mr. LEEWENHOECK, and Monsr. BAYLE be each of them presented with one copy of Mr. WILLUGHBY's *History of Fishes*: And,

That Mr. NEWTON's *Philosophiæ naturalis principia mathematica* be printed forth with in quarto in a fair letter; and that a letter be written to him to signify the Society's resolution, and to desire his opinion as to the print, volume, cuts, &c.<sup>\*</sup>

Dr.

\* It is printed in the *Philosoph. Transact.* vol. xvi. N° 182. p. 140. for June 1686.

† Mr. HALLY wrote accordingly to Mr. NEWTON on the 22d of May the following letter, Supplement to letter-books, vol. iv. p. 340.

“SIR,

“Your incomparable treatise, intitled, *Philosophiæ naturalis principia mathematica*, was by  
“Dr. VINCENT presented to the Royal Society  
“on the 28th past; and they were so very sensi-  
“ble of the great honour you have done them by  
“your dedication, that they immediately ordered

“you their most hearty thanks, and that the  
“council should be summoned to consider about  
“the printing thereof. But by reason of the  
“president's attendance upon the king, and the  
“absence of our vice-presidents, whom the good  
“weather has drawn out of town, there has not  
“since been any authentic council to resolve  
“what to do in the matter, so that on Wednes-  
“day last the Society in their meeting judging,  
“that so excellent a work ought not to have its  
“publication any longer delayed, resolved to  
“print it at their own charge in a large quarto of  
“a fair letter; and that this their resolution  
“should

Dr. PAPIN shewed an experiment about boiling of rice in water in his new digester; which in a very little time was become a perfect pulp, the rice being so soft that it seemed in a manner dissolved.

May 26. Sir JOHN HOSKYNs was desired to take the chair.

The minutes of the last meeting were read.

Sir JOHN HOSKYNs upon the inquiry made at the last meeting concerning the times of the invention of the several sorts of painting, said, that one JOHN DE BRUGES was the inventor of painting in oil-colour.

A letter of Mr. WILLIAM MOLYNEUX to Mr. HALLEY, dated at Dublin May 15, 1686, with the figures of the girl overgrown with horny substances, was produced and read.

Dr. SLOANE mentioned an author, named PHILIPPUS INGRASSIAS, giving a like account in his book *de tumouribus*.

Mr. JOHN HARWOOD was proposed candidate by Dr. VINCENT.

Mr. HALLEY brought in an account of Mons. MARIOTTE's treatise *du mouvement des eaux*; and upon mentioning of the heights of jets d'eau, Mr. HOOKE was of opinion, that all those, which exceed forty feet in height, have so great a force, that they presently break into drops, and so spoil the beauty of the fountain.

Mr. HOOKE likewise occasionally mentioned that ice is not only lighter than water, but has a refraction considerably different therefrom.

Part of a letter of Mr. LEEWENHOECK was read, giving an account of the tex-

" should be signified to you and your opinion  
" thereon be desired, that so it might be gone  
" about with all speed. I am intrusted to look  
" after the printing of it, and will take care, that  
" it shall be performed as well as possible. Only  
" I would first have your directions in what you  
" shall think necessary for the embellishing there-  
" of, and particularly whether you think it not  
" better, that the schemes should be enlarged,  
" which is the opinion of some here: but what  
" you signify as your desire shall be punctually  
" observed.

" There is one thing more, that I ought to in-  
" form you of, viz. that Mr. HOOKE has some  
" pretensions upon the invention of the rule of  
" decrease of gravity being reciprocally as the  
" squares of the distances from the center. He  
" says you had the notion from him, though he  
" owns the demonstration of the curves gene-  
" rated thereby to be wholly your own. How

" much of this is so, you know best; as like-  
" wise what you have to do in this matter. Only  
" Mr. HOOKE seems to expect you should make  
" some mention of him in the preface, which it  
" is possible you may see reason to prefix. I must  
" beg your pardon, that it is I, that send you  
" this ungrateful account; but I thought it my  
" duty to let you know it, that so you might ask  
" accordingly, being in myself fully satisfied,  
" that nothing but the greatest candour imagi-  
" nable is to be expected from a person, who has  
" of all men the least need to borrow reputation.  
" I am, &c."

With regard to this claim of Mr. HOOKE, the reader may see the letters of Mr. NEWTON and Mr. HALLEY in the article of the former in the *General Dictionary historical and critical*, vol. vii.

\* Register, vol. vi. p. 320.

\* Letter-book, vol. x. p. 315.

ture of bone, observed in his microscopes, which he found to be composed of four several sorts of pipes or vessels running lengthwise, and ranged in circles about the cavity, and proposing an analogy between the growth of bones and that of wood by the accession of new circles, as it is annually in trees, and comparing the periosteum to the bark of the tree.

Mr. Hooke read a discourse about the application of the pendulum of his level to a clock to make the vibrations thereof as slow as required; and he shewed the manner of applying it to a watch for regulating its balance.

Mr. HALLEY shewed the manner of the course of the trade-winds between the tropics in the Atlantic and the Pacific oceans; as likewise of the monsoons in the Indian seas, as he had learned them partly from his own experience, and partly from conversation with seamen and from their journals; attempting to explain their cause by the rarefaction of the air, where the sun is hottest, whereby the specific gravity of the air being diminished, the cooler air, that is more remote, comes into its place, and drives it upwards, whereby the winds *cæteris paribus* have always an inclination towards the sun. He was ordered to draw up this relation in writing, and to publish it in the *Philosophical Transactions*.\*

Dr. PAPIN gave in an account of an instrument for filtration of his own contrivance†, which was by pouring the liquor into a long-necked funnel, whereby the height of the liquor being considerable, the pressure thereof would be great upon the pores of the filtre; which would occasion a speedier filtration. The experiment was shewn before the Society, and succeeded.

June 2, at a meeting of the COUNCIL were present

	Dr. GALE vice-president
Sir. JOHN HOSKYNs	Mr. HILL
Mr. HENSHAW	Mr. PERRY.

It was ordered, that Mr. NEWTON's book be printed, and that Mr. HALLEY undertake the business of looking after it, and printing it at his own charge; which he engaged to do:

That the business of the *Philosophical Transactions*, as to the encouragement heretofore given by the Society to the publishers thereof, be referred to the consideration of the next meeting of the council: and

That the consideration of Mr. HALLEY's salary in relation to a clause in the orders made Jan. 27 past concerning the Society's clerk, be referred to a fuller council:

That the council-book be searched as to what had been done about Mr. Hooke's salary.

At a meeting of the SOCIETY on the same day, Sir JOSEPH WILLIAMSON vice-president in the chair.

\* It is printed in the *Philos. Transact.* vol. xvi. N°. 183. p. 153. for July, Aug. and Sept. 1686.

† Register, vol vi. p. 321.

Mr. ST. GEORGE ASH subscribed his name, and was admitted fellow of the Society.

The minutes of the last meeting were read.

Two notes from Monf. JUSTEL were read; the one about a great storm of hail lately fallen at Lisle in Flanders<sup>b</sup>: the other about an engine used at Amsterdam for quenching fire: whereupon Mr. HOOKE gave a full account of an engine, which he conceived to be the same, being made with a gut or pipe of canvas to convey the water through crooked passages, where our sort of engines cannot come to play.

Monf. JUSTEL's note gave likewise an account of a smith in Germany, who in the presence of his friend had made iron red-hot by beating it; and of files made at Hamburgh so hard as not to wear at all; and that the pumps at Versailles so much admired are ordinary in the mines of Germany.

<sup>a</sup> Mr. HOOKE shewed the draught and contrivance of a water engine at Hackney made by one Mr. ALDERSEY, wherein three pumps are moved by an axis with a triple crank by means of an over-shot wheel.

A book presented to the Society by the hands of Mr. HOOKE from the author, Mr. BOYLE, intitled *A free Inquiry into the vulgarly received Notion of Nature*<sup>c</sup>, was delivered to Dr. VINCENT, who was desired to read it, and make a report of its contents; and the author was ordered the thanks of the Society.

June 9. Dr. GALE vice-president in the chair.

The minutes of the last meeting were read.

A letter in Latin from Monf. BAYLE to Sir JOHN HOSKYNs, dated at Rotterdam, June 8, 1686<sup>d</sup>, was read, returning thanks to the Society for their present to him of Mr. WILLUGHBY's *History of Fishes*, and promising upon all occasions to serve the Society in what should lie in his power, and particularly in the matter of correspondence.

A foreign gentleman, subscribing his name GEORGIUS RASH, sent in a letter, inclosing, as he conceived, the solution of a problem, whereby the exact quadrature of a circle might be easily found. It was by an algebraical method of inquiring into the properties of a curve called by him *isobole*, because it has its ordinates increasing in the same proportion as the angles made at a point in the axis. Mr. HOOKE having perused it said, that the curve here proposed as new was no other than the *linea quadratrix*, being an old thought of those, who had attempted squaring the circle. See CLAVIUS.

<sup>b</sup> Letter-book, vol. xi. p. 22.

<sup>c</sup> Printed at London, 1686 in 8vo.

<sup>d</sup> Letter-book, vol. x. p. 316.

Mr. CLUVERUS produced a paper sent from Dr. RUDBECK and Mr. PEIRINGER of Upsal, desiring that some specimens of the several English ores, minerals, and stones mentioned therein, might be sent to them, promising to communicate like samples of the minerals and ores of Sweden, if desired.

Two papers of Dr. PAPIN\* were read, the one shewing the great advantage of his new contrived digester above his old one, in saving of fuel, which is so great, that, as he computed, in twenty four hours time 150 pounds of gelly might be made with the expence of but 11 pounds of coals. Which therefore he conceived might be of great use at sea.

The other paper was about drawing the tincture of the cocoa-nut in his digester, so as to keep in all the volatile parts thereof. He produced three tinctures drawn from a small quantity of nuts; the first whereof was very strong both in taste and smell; and excepting that it was somewhat too sweet, might pass for very good chocolate.

A book lately published by EDMUND DICKENSON, M. D. concerning alchemy or the philosopher's stone, and intitled *Epistola ad THEODORUM MUNDANUM Philosophum adeptum de quintessentiâ Philosophorum & de verâ physiologiâ, una cum quaestionibus aliquot de secreta materiâ physica*, was presented to the Society from the author by Dr. SLARE.

Mr. HALLEY read a paper, for a *Philosophical Transaction*†, in which he gave an account of the rule of the decrease of the height of mercury in the barometer, according as the places are elevated above the surface of the earth, shewing how to calculate the heights of the mercury at any height assigned, and *vice versa*, by the help of the spaces between the asymptote and hyperbola; or, which is the same thing, by the logarithms; and proving from the same hypothesis, that the sphere of air cannot much exceed the height of forty miles, both from the extreme rarefaction at the height, and from the depression of the sun at the end of twilight.

June 16, at a meeting of the COUNCIL were present

Dr. GALE vice-president

Sir JOHN HOSKINS

Dr. ROBINSON

Mr. HERBERT

Mr. MEREDITH

Mr. HENSHAW

Mr. FLAMSTEAD

Mr. HILL

Mr. PERRY.

Sir JOHN HOSKINS and Mr. HENSHAW were severally sworn vice-presidents, according to two deputations under the hand of the president, then produced, and the oaths of allegiance and supremacy were administered to them, according to the statute in that case.

\* Register, vol. vi p. 322.

† It is printed in *Philos. Transact.* vol. xvi. N°. 181. p. 104. for May 1686.

CROFTON HAVERS, M. D. Mr. THOMAS MOLYNEUX, and Mr. JOHN HARWOOD were allowed as candidates fit to be proposed to the Society for election.

It was ordered, that the allowance for encouraging the publication of the *Philosophical Transactions* by the secretaries taking sixty copies of them as soon as printed, according to an order of December 13, 1682, be continued till farther order: and

That Mr. HOOKE be allowed his arrears for the years 1684 and 1685; and that the treasurer pay him sixty pounds in full till Lady-day last.

This council do declare their satisfaction in the Society's choice of Mr. HALLEY, notwithstanding his want of the fifth qualification, concluded on by the council of January 27 last past, which at the time of his election the Society was pleased to dispense with.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

Mr. HALLEY made the observation of the variation of the needle upon the stone in the area of Gresham-college, and having found the true meridian, the box being applied thereto, the needle declined 4 degrees 45 min. from the north to the west, and the needle being diverted by the application of iron restored itself four several times to the same point exactly.

Mr. BAILEY presented a letter written in the Chinese character from the King of Mindanao, one of the Philippine isles, to the English factory at Bantam, being very curiously adorned and neatly written.

It was ordered, that part of such English ores, as the Society had a quantity of, be spared for Dr. RUDBECK, professor at Upsal; and that Dr. LISTER and Dr. SLOANE be desired to spare what they could out of their collections, to be sent into Sweden by Mr. CLUVERUS.

Mr. HENSHAW reported, that he had read Dr. DICKENSON's book, presented at the last meeting; and that it consisted of letters of the author to one MUNDANUS, whom he affirmed to have seen make projection during his instructions in the secret of the philosopher's stone, which otherwise he should despair to discover; to which MUNDANUS answers in doubtful terms, encouraging him to proceed, but begs his pardon for not revealing the desired secret.

Two notes from Mons. JUSTEL were read; one giving a farther account of the invention of an anabaptist at Amsterdam for the quenching of fires<sup>a</sup>: the other containing an extract of a letter from Aramont in Languedoc near Avignon, dated May 28, 1686, concerning an extraordinary swarm of grasshoppers there<sup>b</sup>.

<sup>a</sup> Letter-book, vol. xi. p. 24.

<sup>b</sup> Ibid. p. 23. It is printed in the *Philos. Transf.* N<sup>o</sup>. 182. p. 147.

Sir JOHN HOSKYNs presented some bitumen or natural pitch from Pitchford in Shropshire.

Dr. VINCENT returned Mr. BOYLE's *Inquiry into the vulgarly received Notion of Nature*, together with an account of it, which was read.

Dr. PAPIN shewed another experiment of weighing the air contained in a Florence flask, and having counterpoised it, when well evacuated of air, upon the readmission thereof it was found to have gained just forty grains in weight. The quantity of water, that filled the said flask, was four pound fourteen ounces avoirdupoise. Wherefore the water of the air to that of water is as 40 to 34100 or as 1 to 850. The scales not being sufficiently exact, it was desired, that this experiment might be repeated in some larger vessel.

Sir JOHN HOSKYNs produced the *Nouvelles de la Republique des Lettres* for the month of May sent to him for the Society by Monf. BAYLE, the author.

June 23. Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting was occasioned a discourse concerning the variation of the magnetic needle; and it was ordered, that the Society's correspondents should be written to, that they might procure observations to be made of the said variation in places as far distant as possible.

Dr. SLOANZ produced four several sorts of lead and tin ores, which he bestowed on the Society for Dr. RUDBECK.

Dr. LISTER desired to be excused at that time.

Dr. HAYERS, Mr. THOMAS MOLYNEUX, and Mr. JOHN HARWOOD were propounded candidates.

Dr. SLARE gave in a paper concerning a farther examination of the stones sent by Dr. KONIG from Berne, in which paper Dr. SLARE affirmed the stones to yield a small quantity of urinous spirit like spirit of harts-horn; proving it thereby to be an animal substance: and that the caput mortuum thereof would not adhere to Mr. HAAK's strong loadstone.

A note from Monf. JUSTEL was read, giving an account of a book about hygrometers then printing at Paris with cuts: that the hygrometer of the Society's invention was the first: that an history of the buccaniers in the West-Indies was written by a French buccanier or pirate: that two ships, which sailed from Brest in France, had arrived in Batavia in the island of Java in four months time, which was looked upon without example: and that the thermometers had been exceedingly high at Paris on Saturday the 12th of this month of June, by reason of the great heats.

A paper of Dr. PAPIN was read concerning the boiling of fish *in vacuo*; in which paper

paper he proposed, that so boiling it might be serviceable for keeping it a long time from putrefaction<sup>1</sup>.

Dr. SLARE produced a mineral water brought from Surrey within twenty miles of London; which having been kept several months in bottles afforded a very deep tincture from galls; whereas Tunbridge, Ilington, and other vitriolate waters lose that property, being kept but a very little time.

Sir JOHN HOSKYNs related, that one of the Knareborough Spaws in Yorkshire is very fetid and impregnated with much sulphur; and that it had cured several persons, who had been dangerously ill of consumptions.

It was ordered, that Dr. PAPIN, Mr. HALLEY, and Mr. HUNT do consider of the means of making and filling a barometer after the manner proposed by Mr. HOOKE; and that they get one made for the Society.

June 30, at a meeting of the COUNCIL were present

Sir JOHN HOSKYNs vice-president

Mr. HENSHAW  
Mr. HILL  
Mr. HAYNES  
Mr. COLWALL

Dr. GALE  
Mr. MEREDITH  
Mr. ASTON.

Ordered, that a copy of the *History of Fishes* of the best paper curiously bound in Turkey leather, with an inscription or dedication therein, as likewise five others, bound also, be sent to the president:

That the president be desired to license Mr. NEWTON's book intitled, *Philosophiæ naturalis Principia mathematica*, and dedicated to the Society: and

That the treasurer, to encourage the measuring of a degree of the earth, do give to Mr. HALLEY fifty pounds or fifty copies of the *History of Fishes*, when he shall have measured a degree to the satisfaction of Sir CHRISTOPHER WREN, the president, and Sir JOHN HOSKYNs.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the last meeting were read.

A letter of Mr. JOHN CASWELL to Mr. HALLEY, dated at Hart-hall Oxford, June 29, 1686<sup>2</sup>, was read, giving an account of the heights of some hills in Wales and Shropshire, together with the observations of the heights of the barometer, on the tops of them. He mentioned, that Snowdon is 1240 yards high above the sea, the mercury standing thereon at  $25\frac{4}{7}$  inches above the pool: that at Caderidni, the highest mountain in Merionethshire, the mercury stood at  $26\frac{1}{2}$  inches; that on both mountains they were in the clouds. That at Slipstones, a

<sup>1</sup> Register, vol. vi. p. 324.

<sup>2</sup> Letter-book, vol. x. p. 518.

hill in Shropshire, the mercury stood at 28<sup>1</sup>/<sub>10</sub> inches, when at Worthen, a neighbouring place, it stood at 29<sup>4</sup>/<sub>10</sub>; Slitstones being 455 yards higher than Worthen; that there was indeed twelve hours betwixt these observations; but that he had found, that mercury did not move for three days after; so that he considered the observations as made both at the same time.

A letter from Mr. EDWARD SMITH, lately chosen secretary to the Dublin Society, dated Trinity-college Dublin, June 24, 1686<sup>1</sup>, and addressed to the Royal Society, was read; wherein he inclosed the minutes of the Dublin Society from April 26 to May 17, inclusive, containing, among other things, an account of great quantity of poppies spring up in a soil, where never any had been known to grow, and where most certainly none had been ever sown; which seemed an argument for spontaneous or equivocal productions.

A letter of Mr. WILLIAM MOLYNEUX to Mr. HALLEY, dated at Dublin, June 19, 1686<sup>2</sup>, was read, containing some remarks on Mr. Hooke's level and barometer.

Part of a letter of Mr. LEEWENHOECK was read, containing his microscopical observations upon the seeds of several Indian plants, shewing how the leaves and the part designed for the root and stem are wrapped up within the said seeds.

Mr. HOOKE read a discourse concerning the nature of the Chinese character, of their books, numbers, and writing, which he conceived to have been the literal character of some ancient language now lost, so that the figure remaining, and not the sound or *potestas* thereof, it is become a real character, but incumbered with so much difficulty, that there is scarce any other help but memory. He was desired to publish this discourse, according to his intention, in a *Philosophical Transaction*.

A monstrous kitten was produced, having two faces joining together at the eyes, which was in the middle of the common face, and was composed of the meeting of two eyes. Upon dissecting it was found to have but one oesophagus and one aspera arteria, the two mouths joining in one common cavity. The entrails were all single; only the spina dorsii appeared double, the compages of the bones of the skull and spine being most remarkable. It was ordered, that a skeleton should be made thereof.

A farther experiment was tried of weighing the air in a considerable quantity in a great glass bottle; and by reason, that the weight thereof was said to be very considerable, it was thought requisite to make it equiponderent with water, that so the scale might not be charged with too much weight. So having exhausted the air, the bottle by the addition of weights was made just to sink in water; which done, the air being admitted, it was found to have gained in weight 690 grains: the capacity of the bottle in water was found 593052 grains; so that the

<sup>1</sup> Letter-book, vol. x. p. 319.

<sup>2</sup> Ibid.

<sup>3</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 180. p. 63. for March and April 1686.

specific

specific gravity of the air to that of water was at that time as 690 grains to 593052 grains, or as 1 to almost 860, differing very little from the experiment tried on that day fortnight, which made it as one to 852½.

A paper of Dr. PAPIN was read, shewing his contrivance of a ready way of exhausting a vessel, and keeping the vacuum, as long as he pleased; which he proposed as what might be of considerable use in the preservation of juice of plants, fruits, and the like\*.

July 7. Upon reading the minutes of the last meeting, in which mention was made of poppies produced after a spontaneous manner in Ireland, no seed having been there sown, nor poppies growing near; Dr. GALE related, that a field in the parish of Scruton in Yorkshire being sown with barley, there came up nothing but oats. See Mr. RAY's preface to his catalogue of English plants.

Mr. HOOKER's notion of the Chinese language and characters occasioned much discourse about the *piegates* of the letters of the antient languages; some being of opinion, that their sound was continued down to us; and Mr. HOOKER seeming to maintain the contrary.

A note from Monsr. JUSTEL was read, giving an account, that a French ship having lately been at the Cape of Good Hope, had been informed by the Dutch there of an expedition, which they had made towards the tropic of Capricorn; and that they had there found a nation, which answered their violins with thirty instruments, and among the rest with one, that was a sort of flute, which was made with a slit instead of holes, and a ferrel case, that runs up and down upon it, according to the tone intended by it.

The same note mentioned likewise the great variety of all sorts of fruits growing at the Cape of Good Hope.

A letter of Dr. WALLIS to Mr. HALLEY, dated at Oxford, July 2, 1686†, was read, tendering his respects to the Society, and offering to continue the correspondence formerly held with the Oxford Society; which he was desired to do.

A paper of Dr. PAPIN was read, proposing several advantages in refining sugar *in vacuo*, which he conceived might be done much better, quicker, and with less trouble than after the ordinary way‡.

Mr. FAITHORNE, the bookseller, presented the Society with the first tome of Mr. RAY's *Historia Plantarum* of the best paper fairly bound.

A letter of Mr. LEEWENHOECK, dated July 10, 1686, N. S. giving a

\* Register, vol. vi. p. 324.

† Letter-book, vol. x. p. 321.

‡ Register, vol. vi. p. 326.

microscopical account of the texture of oak-wood was produced and ordered to be translated.

Mr. Hooke shewed a contrivance for nicely observing the variations of the magnetical needle; which he promised to prosecute against the next meeting.

An account was read of a sort of substance proper for coach-glasses, being transparent like glass, and impenetrable to the wind and wet; and of an old tomb found near Maintenon in France, wherein were found skulls and bones of a larger size than ordinary; and with them some hatchets of a green sort of stone, called *Pierre de jade*, the same with our turpentine, which the Indians in America use.

July 14. A shirt of fine callico without any seam either in the body or sleeves was produced by Mr. Hooke, who having well considered it, offered at some conjectures about the manner of weaving it; which he promised to communicate in writing.

After the reading of the minutes, a paper of Dr. PAPIN<sup>\*</sup> was read, concerning an experiment tending to shew the force, which a shot receives by the rushing of the air into an exhausted barrel; wherein he designed a farther prosecution of the experiments shewn on the 3d and 10th of March on that subject.

An account of the manner of the propagation of shrimps, in whose eggs the embryo is perfectly formed before exclusion, after the same manner as some sorts of seeds, which contain the whole plants, being part of a letter of Mr. LEEWENHOECK, was read.

Monf. BAYLE presented by the hands of Monf. JUSTEL the *Nouvelles de la Republique des Lettres* for the month of June.

Dr. PAPIN endeavoured to try the experiment of the force of a shot cast out of an exhausted barrel, by observing the number of very thin boards, which the bullet would penetrate: but the apparatus not answering, it was ordered to be tried again.

Mr. HALLEY read the remainder of a discourse about the air, wherein he endeavoured to explain the several phenomena of the baroscope by the change of the wind in this temperate zone, supposing, that the air being heaped up by the meeting of two contrary currents might be the cause of its standing high; and on the other side, two contrary winds blowing from the same place must necessarily evacuate that part of the atmosphere, from which they blew, and consequently cause the mercury in the barometer to sink.

July 21, Mr. HENSHAW vice-president in the chair.

There was shewn a wind-gun of a particular contrivance, which by having its

<sup>\*</sup> Register, vol. vi. p. 326.

receptacle

receptacle once filled with compressed air would discharge four several bullets with so much force, as to bury the bullets in a deal board. The same gun would likewise be charged with gun-powder so, that without any farther trouble than putting in the ball, it would be sufficient to kill five times after this.

A letter of Dr. REISELIUS, physician to the Duke of Wirtemberg, consisting chiefly of complements, was read.

The minutes of the Oxford Society for the month of June were read, containing several remarkable anatomical observations; and, among others, an account of worms bred in the ear.

Part of a letter from Mr. PASCAL was read, relating to an extraordinary storm of wind and thunder on June 14th near Polden hills in Somersetshire about four miles from Bridgewater; whereby many hay-cocks were taken up into the air, and some of the hay scattered at two miles distance.

A paper of Dr. PAPIN about a way of filling the barometer with mercury, freed as much as possible from air, was read.

A printed letter of Dr. JOHN ANDREAS STISSER, physician at Hamburg, intitled *De Machinis fumidularis curiosis*, and addressed to the Royal Society, was presented by Dr. GALE from the author.

The experiment of the mercury sinking in the barometer upon application of heat not succeeding, by reason that some air was got into the head of the glass, it was ordered to be tried again at the next meeting, and that more quicksilver be put into the vessel, into which the end of the cane is immersed.

July 28, at a meeting of the COUNCIL were present

	Dr. GALE vice-president,
Mr. HENSHAW	Mr. ASTON
Mr. HILL	Mr. MEREDITH.
Dr. ROBINSON	

It was ordered, that Mr. HUNT be paid 7 l. 10 s. for drawing and engraving several of the figures in the *History of Fishes*:

That Mr. HUNT's salary for half a year due July 14 be paid him, viz. 20 l.:

That Mr. HAMERLON's bill for printing off the cuts of the *History of Fishes* be paid: and

That the copies of that book be left with several booksellers to be disposed of; and that as good a bargain as possible be made with the bookfellers, not exceeding one shilling a book.

At a meeting of the Society on the same day, Mr. HENSHAW vice-president in the chair.

After the reading of the minutes, there happened much discourse about the way of preserving ships from the worms; and it was remarked, that sheathing with lead was the best expedient, and found to be so by the experience of Sir ANTHONY DEANE; but that the carpenters finding it against their profit opposed it by affirming, that the iron of the pintles of the rudders of ships so sheathed were much more apt to be corroded by the sea-water than those sheathed with wood; which yet was a groundless supposition.

Dr. ROBINSON thought, that it might be worth examining, whether some woods would not be proof against these worms, and consequently proper for sheathing; into which he proposed, that tallies of several sorts of wood might be laid in the sea, where these worms are, to see which was the least apt to produce them.

Mr. EVELYN was of opinion, that japanning or lackering might be a very good preservation for ships; against which it was objected, that the motion of the seams of a ship would be apt to crack the varnish, and so the worms might find entrance.

Mr. HOOKE said, that true Indian lac or varnish is the gum of a tree; and that it was usually mixt with an oil; and that it is, when green, of a very poisonous nature, and would make the flesh swell where it had touched the skin.

A paper of Dr. PAPIN was read concerning an experiment of shooting by the rarefaction of the air; and he shewed the said experiment of shooting with two exhausted barrels, a long and short one; and it was found, that the longer barrel carried farthest, and that the velocity of the lead, being of about two ounces, out of the longer barrel was about twenty feet in a second of time.

*August 4.* Mr. HENSHAW vice-president in the chair.

Upon reading the minutes of the last meeting, wherein it had been proposed, that Chinese lac might be a good preservative for ships, Mr. HOOKE said, that upon inquiry he had found, that the Chinese junks are varnished with lac only above water: and he observed, that the fabric of those junks is without ribs, the planks only laced with bambos, and so plastered.

A letter of Mr. JOHN CASWELL to Mr. HALLEY, dated August 3, 1686\*, was read, containing a farther account of his observations of the height of the mercury on Snowdon and other high hills in England and Wales.

An account was read of an experiment made by Dr. PAPIN, tending to prove,

\* Register, vol. vi. p. 329.

\* Letter-book, vol. i. p. 53.

that

that the medium of the barometer rarefied, as it is, is still subject to be contracted and expanded by heat and cold.

A letter of Mr. WILLIAM MOLYNEUX to Mr. HALLEY, dated at Dublin July 20, 1686<sup>a</sup>, was read, wherein he owned himself fully satisfied of the performance of Mr. Hooke's level; promised what account he could procure of the rides on the coast of Ireland, and gave his sentiments about the properest way for actual mensuration, in order to survey a degree of the earth. "I am most heartily glad," says he, "that the Royal Society have put you upon so useful an enquiry as the measure of a degree upon our earth: you know there have been many attempts towards it, how accurate I cannot tell. Mr. NORWOOD's was received, till of late Mons. PICART pretends to be more exact, and Mr. BERNARD de ponderibus & mensuris differs a little from both. I have not time at present to consult the performances of these men in this particular, and therefore am unable to advise you what method to take in mensuration. But this I am apt to believe, let a hundred men try it, and they will all differ, though perhaps the difference may be inconsiderable. However, the attempt is laudable and deserves encouragement. I think FERNELIUS's determination in this matter is not much relied upon; but SNELLIUS seems to have taken great pains herein; and indeed his country is the best adapted in the world; it is so level and even, one may measure to great exactness."

The Society then adjourned after their usual manner till farther orders.

*Oct. 27.* The Society met again by order of the president.

Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting, it was remarked<sup>b</sup>, that there was good authority to prove, that some ships of the Romans and old Saxons were sewed together. This was supposed to be only small vessels: And it was affirmed by the same person, that he had seen in England such a sewed boat, the outside being lined with a raw hide.

Dr. GALE proposed likewise, that WITZEN's book of naval architecture being written in Dutch should be procured to be translated into English. It was recommended to the Society to consider of a person knowing in the language and subject of the book, proper to translate it.

Several letters from Mons. JUSTEL were produced and read, in one of which<sup>c</sup> he gave an account of an observation made by the Jesuits at the Cape of Good Hope, whose longitude they had found to be 18° to the east of Paris; as also of one CLAUDIUS, a young physician of Breslaw in Silesia, a good master of draw-

<sup>a</sup> Register, vol. vi. p. 328.

<sup>b</sup> Letter-book vol. x. p. 323.

<sup>c</sup> By Dr. GALE, as appears by the next page.

ingraph.

<sup>d</sup> Letter-book, vol. xi. p. 25.

ing, employ'd by Mr. VAN RHEDEN in an history of the plants of that country; that there were already two great volumes full, one of plants, the other of draughts of them, which would be published: and that the voyage of father TACHARD, a Jesuit, was printing at Paris.

Another letter described the manner of transporting the great globes made for the cardinal D'ESTREES by father CORONELLI, designed to be presented to the French king; which manner was, that the large carts, in which they were to be carried, were placed upon low wheels with four axle-trees, that so the wheels might be changed, at the turning of a corner, without altering the position of the case.

The same letter gave an account of a book then printing, written by a Bernardine Monk, tending to prove the world 1800 years older than it is commonly believed.

A third letter inclosed a printed paper in Italian from Rome, being a description of a manner of copying any draught upon paper by help of a lens collecting the rays of the sun, when reflected from a speculum on the original draught. This was asserted by Mr. Hooke to be the same or very near the same with the contrivance of his picture-box long since shown before the Society at Arundel house.

This letter gave likewise an account, that the intendant of the gallies had growing in his gardens all the curious plants of America: and that he had sent an intelligent draughtsman into America, who had orders to make an exact draught of what he should find curious and uncommon.

It also mentioned the extraordinary diligence, which had been used in making the new fort, built by the French at Hunningen defensible in five days.

A fourth letter<sup>4</sup> gave an account that CAMPINI had caused a tube of 100 palms to be made at Rome, very light, being in four pieces shutting into one another: That the number of the inhabitants at Rome, not reckoning the Jews, who were about 30,000, amounted to above 120,000 souls *communibus annis*, of which there died 3000 yearly.

This letter inclosed a very curious inscription lately found at Rome, in the base of a pillar.

A letter of Monsr. BAYLE was read, including his *Nouvelles de la republique des lettres* for September.

Mr. MONSON formerly elected, being now returned from his travels, subscribed his name, and was admitted fellow.

Mr. Hooke produced a stone taken out of a quarry in the middle of Portland,

<sup>4</sup> Letter-book, vol. xi. p. 26.

wherein

wherein were the impressions of a shell of the nautilus kind, being about two feet diameter, in four turns whereof part of the shell still continued, and there appeared within the substance thereof a shell like the mother of pearl or oyster-shell, which was found to be so by its shape, taste and smell. He promised to make farther proof thereof against the next meeting.

Dr. PAPIN gave in a paper <sup>e</sup>, containing an account of an experiment tending to a discovery of a means to facilitate evaporation, so as to save both fuel and time ; which he attempted by conveying the heat to the liquor to be evaporated by means of a worm ; which in some measure answered his expectation.

Nov. 3. Sir JOHN HOSKYNs vice-president in the chair.

After the reading of the minutes of the last meeting, Dr. VOSSIUS's interpretation of the inscription found on the base of a great pillar at Rome, read at the preceding meeting, was produced and read ; and the inscription and commentary were ordered to be inserted in the first *Philosophical Transactions* <sup>f</sup>.

A letter in Latin from Signor FRANCESCO SPOLETO to the Society, dated at Venice Aug. 26. 1686 <sup>g</sup>, was presented by Signor SAROTTI ; which letter being chiefly to request the Society's opinion of a book of his sent to them, the said book was recommended to Mr. HOOKE to peruse, and give an account of it.

Mr. HOOKE shewed to the intire satisfaction of the Society the shells in and upon the stone, which he took to be formed from a nautilus. He was desired to get it cut with a saw through the middle, to try, if any valves could be discovered therein.

Then the Society being a sufficient number proceeded to the election of the three candidates formerly proposed and approved by the council ; whereof Dr. CLOP-TON HAINES being unknown to Mr. ASTON, the latter refused to give his ballot either in the negative or affirmative ; by which means the election became void ; and Mr. ASTON, desired that the same might be recorded, which the vice-president ordered accordingly.

After this Mr. THOMAS MOLYNEUX and Mr. JOHN HARWOOD were ballotted for and elected.

Dr. AGLIONBY presented the Society with his book of the lives of the painters.

Two letters of Mons. JUSTEL were read, in one of which he gave an account of a very antient sepulchre lately found in France near the river Eure supposed to be older than the establishment of Christianity in that country : which Dr. AGLIONBY took home with him, and promised to translate. This was sent to the Society, from Mons. VILLERMONT.

<sup>e</sup> Register, vol. vi. p. 329. <sup>f</sup> They are printed in N<sup>o</sup> 183. p. 172. <sup>g</sup> Letter-book, vol. x. p. 325.

Another letter of Monsr. JUSTEL gave an account of a little man lately presented to the French king, from Quimpercorantin in the Lower Bretagne. He was thirty-seven years old, had a great beard, and his stature was but sixteen inches.

The same letter gave a farther account of the transparent substance not brittle, and therefore proper to be used instead of coach-glasses; that it was made of hogs bladders, whereof there were some large enough to make pannels of sixteen inches one way, and thirteen or fourteen the other.

It mentioned likewise, that 600 manuscripts were found in the castle of Buda, said to be the remains of a library of MATTHIAS CORVINUS King of Hungary: and that there was an answer published in France to Sir WILLIAM PETTY's essay on *The Comparijon between London and Paris*.

Dr. PAPIN shewed the experiment of the engine, that consumes smoke, which had been formerly communicated from France. The experiment succeeded according to expectation; and Sir PETER COLLITON suggested, that this might be of great use in discharging damps in mines; which the vice-president approved, since the heavy matter of the damps lying undermost must of necessity come to the furnace, and so be dispersed by the fire.

A letter of Monsr. CASSINI to Mr. HALLEY, dated at Paris, October 10, 1686<sup>a</sup>, was read, giving an accurate account of the discovery of the two new satellites of Jupiter, and stating their periods and distances, with nice epochs of their motions.

A letter of Mr. WILLIAM MOLYNEUX to Mr. HALLEY, dated at Dublin, September 21, 1686<sup>b</sup>, was read, giving, amongst other things, an account of the tides there, wherein it was remarkable, that the high water upon the quarter moon falls out later by half an hour, in respect of the moon's southing, than in the new and full; whereas at London the quarter moons make high water above an hour and a quarter sooner than the new and full.

There was likewise submitted to the opinion of the Society a paper from the same gentleman, giving the reason, why in a telescope two or three glasses invert objects; and that four erect them again<sup>c</sup>: which paper the Society thought fit to order to be printed<sup>d</sup>:

A French paper communicated by Mr. BOYLE concerning an uncommon hail of a prodigious bigness and form<sup>e</sup>, was read.

A letter of Dr. REISELIUS to Mr. HALLEY, dated at Stutgard, October 8, 1686<sup>f</sup>, was read, giving an account of some books, chiefly medical, lately print-

<sup>a</sup> It is printed in the *Philos. Transact.* N<sup>o</sup>. 187. p. 299. for April, May, and June 1687.

<sup>b</sup> Register, vol. vi. p. 332. It is printed in the *Philos. Transact.* N<sup>o</sup>. 184. p. 192. for Octob. 1686.

<sup>c</sup> Register, vol. vi. p. 333.

<sup>d</sup> *Philos. Transact.* vol. xvi. N<sup>o</sup>. 183. p. 169.

<sup>e</sup> Register, vol. vi. p. 330.

<sup>f</sup> Letter-book, vol. x. p. 328.

ed in Germany and elsewhere, and concerning Mr. Hooke's barometer, and the method of staining the lapis calchedonius, &c. Which letter (it being late) was referred to another meeting.

Nov. 10. Sir EDMUND KING was desired to take the chair in the absence of the vice presidents.

Sir EDMUND KING gave an account of a patient of an acquaintance of his, who was seventy five years of age, when he died, and for twelve years before his death began to suspect his own understanding, and became very melancholy, and at length fell into a kind of moribundity or fatuity, and at last died. Upon dissection Sir EDMUND found, that there was a very large stone in the gall, but that the rest of the viscera were sound. But he observed, that the brain was thrunk about a third part, and that there was about a pint of water between the meninges filling up the cavity. Afterwards examining the glandula pinealis, said by Monf. DES CARTES to be the seat of the soul, he found, that there was in it a stone very large in proportion to the gland, in which it was found, so that it seemed to fill it, and was covered with the skin thereof. He shewed the stone, and at the request of the Society promised to give in writing a full account thereof\*.

One Mr. BULLOCK, a carpenter, made a proposal to the Society of an invention of his in mechanics, whereby he pretended to be able to increase force to such a degree, as that two men should be able to move or raise as great a weight as many oxen.

Sir EDMUND KING related, that in digging for a common sewer near Christ's Hospital several coffins were dug up; amongst which was one, wherein the body was dried up like bacon, and being cut with an axe, it cut like an over-dried neat's tongue; and another, wherein there was a body formed as it were in dust, the bones and all being mouldered into powder.

The verbal process upon the discovery of an antient sepulchre in the village of Cocherel upon the river Eure in France\*, communicated by Monf. JUSTEL, and translated from the French by Dr. AGLIOSBY, was read.

Nov. 17, at a meeting of the COUNCIL were present

Mr. HENSHAW vice-president

Sir JOHN HOSKYNs

Mr. HERBERT

Sir RICHARD BULKELEY

Mr. HAYNES

Mr. HILL

Mr. PERRY.

Mr. MEREDITH

It was ordered, that Dr. PAPIN be allowed half a year's salary due to him at Michaelmas last :

- \* Register, vol. vi. p. 335. *Philos. Transact.* N<sup>o</sup>. 185. p. 228.
- \* Ibid. p. 221. for November and December.

Mr.

That Mr. JOHN HILLS, stationer, be allowed his bill for paper delivered for the cuts of the *History of Fishes*, being 16*l*.: and

That Mr. HOOKE be allowed his bill of charges, being 3*l*. 10*s*. in full of all his expences to this day.

Mr. MEARES, son of Sir THOMAS MEARES, was proposed to the council as a candidate, and balloted for and approved for election.

It was ordered, that Mr. PITFIELD's translation of the *Memoires pour servir à l'Histoire naturelle des Animaux* be licensed: and

That Mr. FLAMSTEAD's tide-table for the year 1687 be printed\*.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

A committee was ballotted for and chosen to audit the treasurer's accounts, consisting of Mr. WALLER, Mr. LODWICK, Mr. HOUGHTON, Mr. PITFIELD, and Mr. CLUVERUS.

Dr. CLOPTON HAYERS was elected a fellow.

The minutes of the last meeting were read, as also the statutes concerning the method of election of the council and officers, according to custom.

Mr. HOOKE gave an account of the book of Signor FRANCESCO SPOLETO, which had been recommended to his perusal. He said, that the author had well determined the problem of the pressure of a body on an inclined plain: but that to the second part concerning the separation of the gall in the liver he could not so readily assent.

He likewise remarked, that the manner of evacuating damps in the mines at Leige was after the manner of the French engine for consuming smoke.

Dr. TYSON and Dr. SLOANE asserted, that the petrification of the glandula pinealis was not a very extraordinary case; and that there were several instances of this accident in authors; and among others in Dr. REGNER DE GRAAF *De succo pancreatico*; but that the like stupidity with that mentioned by Sir EDMUND KING was not found in those cases.

Dr. TYSON observed, that in the head of a madman, who died in the hospital of Bedlam, he had found two or three small bladders of water.

Sir RICHARD BULKELEY said, that he had been informed of a gentleman at Cambridge, a good poet and mathematician, who, after his death was found to have no part of his brain found, but all wasted away to a small matter, and like a

\* It is printed in the *Philos. Transact.* N°. 185. p. 252.

lump of putrefaction; and that when alive he had no other symptom than that he could not endure the heat of the sun on his head.

Dr. SLOANE remarked, that he had been informed, that at Tholouse, where they shewed the dead bodies preserved in a vault from putrefaction, there had formerly been a lime-kiln, or else a great heap of lime laid; whereby the earth being impregnated with its adust particles became this preservative: but that the rest of the earth thereabout had no such quality.

Mr. PACKER said, that he had been informed, that there was a body dug up in East-Cheap, which had been long buried, but appeared very fresh, as if newly laid in the ground; but upon admission of the air it putrefied immediately.

Dr. TYSON shewed an embryo, as he believed, of about six weeks or two months. It was swimming in the liquor of the amnion (which was very full) and was suspended by the vasa umbilicalia from the coat of the amnion.

He observed, that the chorion, which he had separated, was plainly vascular, and tacked all over by vessels to the amnion.

Two papers of Dr. PAPIN\* were read, the one about farther improvement of his digesting engine; the other about a new way of preserving fruit by boiling it *in vacuo*. He produced some currans preserved after that manner, and said, that by a mercurial gage he found, that there had at first been air enough produced to counterpoise a third part of the pressure of the atmosphere; but that afterwards that substance or vapour returned into the fruit. He produced likewise some cherries so preserved. The juice and smell of both were found very good, and the method of preserving approved.

Nov. 24. Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting it was affirmed by Dr SLOANE, that quick-lime destroys the volatile salt of sal armoniac; but this assertion was opposed by Dr. PITT and Dr. ROBINSON, who said, that the mixture of quick-lime with sal armoniac in distillation does not destroy the volatile salt; but that rather it agitates it to that degree, that no part will rise in a dry form, but all in liquor, which by this manner of distillation is drawn much more pungent than by the ordinary way.

Dr. ROBINSON affirmed, that the mummies or bodies dried in the sands of Africa will neither relent nor perish by moisture.

A letter of Mons. JUSTEL was read, wherein he gave an account of new globes to be made at Paris by Father CORONELLI, who made those for the Cardinal d'ESTREES of fourteen feet diameter. These lesser were to be about three feet and a half, and would be afforded for sixteen Louis d'or to those, who would ad-

\* Register, vol. vi. p. 337, 338.

vance to encourage the work: and that the same father had a design to undertake a new Atlas.

Mr. THOMAS MOLYNEUX presented from his brother, Mr. WILLIAM MOLYNEUX of Dublin, his book, intitled *Sciothericum telescopicum, or a new Contrivance of adapting a Telescope to a horizontal Dial for observing the Moment of Time by day or Night* <sup>b</sup>.

The statutes were then read, according to custom, this being the meeting next preceding the anniversary election.

A letter of Dr. WALLIS to Mr. HALLEY dated at Oxford, November 8, 1686<sup>c</sup>, was read, wherein he mentions to have seen a child, whose hands and feet were each articulated with five fingers and toes besides the thumbs and great toes; and those not at all monstrous, but as well proportioned as the four ordinarily are.

This letter gave likewise an account of an uncommon dropsy in a maid, out of whose belly was taken sixty three quarts of water by measure; and approved of Mr. HOOKE's remarks on the China character, most of which Dr. WALLIS had found to be true by former inquiries into the Chinese books in the Bodleian library.

Dr. PITT upon occasion of this letter gave his opinion concerning the cause of the dropsy, which he conceived not to proceed from the breaking of the lympheducts in the abdomen, as some had thought, but rather from an obstruction of the glands, whereby a due separation of the serum not being made, it falls sometimes in such prodigious quantities into the belly.

Upon the mention of the embryo shewn at the last meeting by Dr. TYSON, and said to be of about six weeks or two months, Dr. PITT said, that according to the observation of Dr. HARVEY in his book *De Generatione* no embryo can be discerned in the womb till after two months conception.

A letter of Mr. HEVELIUS, dated at Dantzick, April 17, 1686, N. S.<sup>d</sup>, was read, returning thanks to the Society for their present of the *History of Eclipses*; and communicating his observations of the eclipse of Jupiter by the moon, March 31, 1686; and justifying Mr. OLDENBURG against an aspersions of Mr. HOOKE, who had represented, that the former had written to Mr. HEVELIUS more and different things, than he had been directed to do by the Royal Society.

A paper of Dr. PAPIN was read, containing a demonstration of the velocity, wherewith the air rushes into an exhausted receiver. This he endeavoured to make out by comparing it with the velocity of water and that of other liquors, that are more ponderous, when under the same pressure. The Society approving

<sup>b</sup> Printed at Dublin, 1686 in 4to.

<sup>c</sup> Letter-book, vol. x. p. 331.

<sup>d</sup> Ibid. p. 333.

the design ordered the paper to be registered, and published in the *Philosophical Transactions*.\*

Nov. 29, at a meeting of the COUNCIL were present

Sir JOHN HOSKYNs vice-president

The Earl of Carbery

Mr. HAYNES

Sir CYRIL WYCHE

Mr. PERRY

Mr. HENSHAW

Mr. ASTON.

It was resolved, that there is a necessity of a new election of a clerk in the place of Mr. HALLEY; and that it be put to the ballot, whether he be continued or not.

It was ordered, that the treasurer pay Mr. HALLEY 13 *l.* 10 *s.* in full for five dozen of *Philosophical Transactions* of a sort from N<sup>o</sup>. 179 to N<sup>o</sup>. 183 inclusive, which had been delivered for the Society's use to Mr. HUNT.

That at the next council a committee be appointed to inspect the books of the Society, to see, whether the entries be duly made: and

That Dr. PAPIN's book of experiments about the improvement of the new digester and air-pump be licensed to be printed; which was done by the vice-president.

Nov. 30 being the anniversary day of election, the following eleven members were continued of the council,

The Earl of Carbery

Sir JOHN HOSKYNs

Mr. COLWALL

Mr. PEPYS

Mr. EVELYN

Sir JOSEPH WILLIAMSON

Dr. GALE

Sir CYRIL WYCHE

Mr. HENSHAW

Sir CHRISTOPHER WREN.

Mr. HILL

The ten chosen into the council were

Dr. AGLIONBY

Mr. LODWICK

Mr. CREED

Sir JOHN LOWTHER

Sir ANTHONY DEAN

Mr. PACKER

Mr. HOOKE

Mr. PITFIELD

Sir EDMUND KING

Mr. WALLER.

The officers elected were

The Earl of Carbery president:

Sir JOHN HOSKYNs } secretaries:

Dr. GALE

Mr. HILL treasurer.

\* Register, vol. vi. p. 339. It is printed in the *Philosoph. Transf.* N<sup>o</sup> 184. p. 193.

VOL. IV.

T t t

Between

Between this and the former anniversary election the Society lost a very learned member,

JOHN PEARSON, D. D. Lord Bishop of Chester, who was son of Mr. ROBERT PEARSON, rector of Creak and Snoring in Norfolk, by ELIZABETH, one of the daughters of Dr. RICHARD VAUGHAN, successively Bishop of Bangor, Chester, and London. He was born at Snoring, February 12, 1613, and sent in May, 1623, to Eton school, from whence he was elected to King's-college Cambridge in April, 1632. He took the degree of bachelor of arts in 1635, and that of master in 1639, in which year he resigned his fellowship of the college, and lived afterwards a fellow commoner in it. The same year he entered into holy orders, and on the 30th of December was collated to the prebend of Netherhaven in the church of Sarum. In June, 1640, he was appointed chaplain to JOHN Lord Finch, lord keeper of the great seal of England, by whom in December that year he was presented to the living of Torrington in Suffolk. Upon the breaking out of the civil wars he became chaplain to the Lord Goring, whom he attended in the army; and afterwards to Sir ROBERT COOK in London. In 1650 he was made minister of St. Clements East-Cheap in London<sup>1</sup>. In 1657 he and Mr. PETER GUNNING, afterwards Bishop of Ely, had a dispute with two Roman catholics upon the subject of schism; a partial account of which was published the year following at Paris<sup>2</sup>. In the year 1659 he published at London in 4to his *Exposition of the Creed*, dedicated to his parishioners of St. Clements East-Cheap, to whom the substance of that excellent work had been preached several years before in the form of sermons, and by whom he had been desired to make them public. This book was afterwards reprinted at London in folio with considerable improvements. In the same year, 1659, he published there in 4to *The Golden Remains of the ever-memorable Mr. JOHN HALES of Eton College*, to which he prefixed a preface, containing the character of that great man drawn with great elegance and force. Soon after the restoration he was presented by Dr. WILLIAM JUXON then Bishop of London to the rectory of St. Christopher's in London, to which he was collated on the 17th of Aug. 1660<sup>3</sup>; and in the beginning of the next month was created, together with several other eminent men, doctor of divinity at the university of Cambridge in pursuance of the King's letters mandatory<sup>4</sup>. On the 22d of the same month he was installed prebendary of Ely<sup>5</sup>, and on the 26th archdeacon of Surrey; and before the end of the year was made master of Jesus-college in Cambridge, and succeeded Dr. LOVZ in the Margaret professorship of divinity in that university<sup>6</sup>. March 25, 1665, he was nominated one of the commissioners for the review of the liturgy in the conference at the Savoy<sup>7</sup>; and on the 17th of October following was installed in the first prebend of the cathedral of Ely<sup>8</sup>. April 14th 1662 he was admitted master of Trinity college in Cambridge, in the room of Dr. HENRY

<sup>1</sup> General Dictionary, article of PEARSON (JOHN) Vol. VIII. p. 234.

<sup>2</sup> Ibid note (A).

<sup>3</sup> NEWCOMB Repertorium Ecclesiast. Vol. I. p. 345.

<sup>4</sup> Bishop KENNET's register and chronicle, p. 251.

<sup>5</sup> Ibid. p. 880.

<sup>6</sup> Ibid. p. 393.

<sup>7</sup> Ibid. p. 547.

<sup>8</sup> Ibid. p. 547.

FERNE, advanced to the bishopric of Chester \*; and in Aug. following he resigned his rectory of St. Christopher's†, and his prebend of Netherhaven in the church of Salisbury‡. February 21, 1662, he was proposed candidate of the Royal Society, and being on the 14th of March elected fellow, was admitted April 25th, 1667. In 1672 he published at Cambridge in 4to, *Indicis Epistolarum S. IONATHAN*, in answer to MONSIEUR DAILLE. To which is subjoined ISAACI VOSSII *Epistole due adversus DAVIDEM BLONDELLUM*. Upon the death of Dr. WILKINS, Bishop of Chester, November 19, 1672, Dr. PEARSON was promoted to that see, to which he was consecrated, February 9, 1673. In 1682 his *Annales CYPRIANICI, five tredecim Annorum, quibus S. CYPRIANUS inter Christianos versatus est, histeria Chronologica*, was published at Oxford in folio with Bishop FELL's edition of that father's works. The Bishop of Chester was disabled from all public service by an ill state of health a considerable time before his death, which happened at Chester, July 16, 1686. Two years after his posthumous works were published by Mr. DODWELL at London in 4to under the following title: *CL. JOANNIS PEARSONI, Cestriensis nuper Episcopi, Opera posthumæ: De serie primorum Romæ Episcoporum Dissertationes due: quibus præfiguntur Annales PAULINI & Lectiones in Acta Apostolorum. Edenda curavit & auxit H. DODWELLUS, cujus accessit de eadem successione Dissertatio singularis*. Besides the works abovementioned the Bishop published two sermons, one printed at London, 1661, in 4to, intitled *No Necessity for a Reformation*; and the other preached before the King, March 19, 1671, on Ecclef. xii. 14. and published by his Majesty's special command, London 1671 in 4to.

Dec. 1, The Earl of Carbery president in the chair.

His Lordship as president took the oaths of allegiance and supremacy according to the statutes; and appointed SAMUEL PEPYS, Esq; Sir JOSEPH WILLIAMSON, Sir JOHN HOSKYNs, Sir CYRIL WYCHE, THOMAS HENSHAW, Esq; and THOMAS GALE, D. D. his vice-presidents for the year ensuing.

Upon reading the minutes of the last meeting, Dr. SLOANE affirmed, that having mixed salt of hartshorn and quick-lime together, and then trying to sublimate the salt again, he had found, that none of it would rise in the form of salt, but that it would be all converted into liquor or spirit.

He likewise observed, that he had formerly with some others made a muscular dissection of a human body at Montpellier; and that to preserve the body from putrefaction, the bowels being taken out, they infused a tincture of myrrh and aloe drawn with spirit of wine, and kept it covered with fir-thavings in a coffin, whereby it was preserved three months in the middle of summer.

He observed also, that cedar-dust is esteemed the best preservative in this case; but that it was not procurable at Montpellier.

\* KINNET, p. 547.

† NEWCOURT, ubi supra.

‡ KINNET, p. 744.

Sir JOHN HOSKYNs was of opinion, that all the true mummy is from the embalmed bodies of Egypt; and that the relations, that one fort is from bodies buried and dried in the sands, are probably fabulous; at least worth farther inquiry.

Mr. CLUVERUS was desired to peruse Mr. WILLIAM MOLYNEUX's *Sciotericum teluscopium*, and to report to the Society the contents of it.

A letter of Dr. WALLIS to Mr. HALLEY, dated Oxford, November 25, 1686, was read, giving an account of what passed in the Society at Oxford. The letter was as follows:

"Our secretary, Mr. BAINBRIG, being not yet returned, I send you this account of what we have been doing. Yours I communicated to our company; who were well pleased with it. The name of the child, I mentioned in my last, is DAVID RICHARDSON, son of JOHN RICHARDSON, a barber, lately in St. Martin's lane London; but now dead. The mother carries the child from place to place to shew; expecting to be gratified for so doing. He hath not two thumbs on one hand (as, I guess by yours, you did mistake me) but on each hand one (as we have) and five other fingers instead of our four, all in good proportion (at least if the thumbs be not, as they seemed to me, somewhat too little;) and manageable (for ought I discerned) as ours are, with the advantage of one finger more on each hand: the six toes on each foot just as our five are.

"The experiment I proposed in my last, we find (upon discourse of it here) to have been tried amongst the Florentine experiments, number 12 of projected bodies; and that the horizontal projection doth but little (if at all) hinder the perpendicular descent. Somewhat it seems to do: and the like we find to be in swimming and flying.

"Beside the case of Mr. BROWN, we had here (the last year) in Mr. HODGES (parson of Wightam) of Baliol-college, who died there of a dropsy, seven gallons of water taken out of his body: which was then thought very much; till that of  $15\frac{1}{2}$  gallons taken out of Mr. BROWN. We made preparation for observing the eclipse last Friday; but the weather was such, that no moon was to be seen all night. We hope it proved better with you.

"We had a particular account of an observation made at Salisbury in November, 1684, by Colonel WINDHAM, and Mr. WARNER, of the altitude of quicksilver in a baroscope, at several heights from ground to the top of the spire; and at what proportions it decreased.

"Dr. PLOT gave us an account of a strangely great cucumber, measured by himself, this summer, August 27, in the garden of Dr. JACOB (a physician there) in length 3 feet 10 $\frac{1}{2}$  inches (which is more than an ell long) and in com-

<sup>†</sup> Letter-book, vol. x. p. 340.

"pass

“ pafs at the greateft part nine inches ; near the ftalk fix inches. A giant to  
 “ your little man of France. He meafured it again September 18, when it was  
 “ fomewhat lefs, in length three feet 9 $\frac{1}{2}$  inches : In compafs nine inches in the  
 “ biggeft part, and 5 $\frac{1}{2}$  near the ftalk : And October 13, much the fame meafure.  
 “ He takes it to be the cucumis anguinus of botanifts.

“ We had an account of Mr. WELLS here in Holywell, a cook about fixty-  
 “ feven years old, who has been troubled with the gout twenty-five years. He  
 “ constantly cures himfelf by drinking beer or ale, in which muftard-feed is  
 “ fteeped : and the fame hath been found beneficial to others. Into a gallon of  
 “ table beer he puts half a pint of muftard-feed, and lets it ftand nine or ten  
 “ days.

“ Dr. PLOT informs, that Sir WILLIAM ROOK near Canterbury, in a de-  
 “ plorable condition by a dropfy, was at length advifed to fteep four cloves of  
 “ garlic in each quart of ale he drank at meals or otherwife ; and was thereby  
 “ reftored to perfect health in about a month’s time.

“ Mr. MUSGRAVE informs from a phyfician in the country, that he cured a  
 “ rheumatifm by giving a ftrong vomit each day for four or five days together.

“ He informs of a new fifhing trade of herrings, begun in Somerfetfhire : the  
 “ coming of herrings up the Severn not known before this year ; and now in  
 “ great quantities.

“ A copy of a letter from R. P. vicar of Kildwick in Yorkfhire gives account  
 “ of an extraordinary eruption of water in June laft ; whereby the inhabitant of  
 “ Kettlewell and Starbotten in Craven in Yorkfhire fuffered great damage. It  
 “ was after a great clap of thunder : the rock on the eaft fide of them was feen  
 “ by divers eye-witneffes vifibly to open, and water to fpout up in the air as high  
 “ as an ordinary fteeple : and the current of water thence continued for about an  
 “ hour and half violently down the hill, as in one intire body, with a breaft, as  
 “ if it would drown the whole towns. Several houfes were quite demolifhed, and  
 “ not a ftone left ; others gravelled up to the chamber-windows, and great rocks  
 “ thrown down from the hill into the valley, and thereby immoveable : and  
 “ much more damage of goods, cattle and meadows. Since that firft flood, there  
 “ have been two others, but not fo great and dangerous. Thefe are the chief,  
 “ of what hath occurred to us fince my laft. I am yours to ferve you,

“ JOHN WALLIS.”

Sir JOHN HOSKYNs produced fome fmall cubical grains of a fubftance refembling  
 a marcasite, which were very near true cubes, each fide about the eighth part of  
 an inch.

Dr. SLOANE remarked, that fuch cubical grains were found in Yorkfhire, and  
 were a fort of pyrites.

A letter of JOHN WEICHARD VALVASOR of Carniola to Dr. GALE, dated at Wagensperg in Carniola, Aug. 29. 1686. N. S.\* was read, containing a method of casting brass statues of an extraordinary thinness, which, as was alledged by Mr. HOOKE, was according to the process commonly used; the only invention consisting in the addition of a third part of bismuth or zink to his brass, whereby it would be made to run much better, and by consequence cast a thinner statue. This letter was delivered to Dr. AGLIONBY, who was desired to consider well of it, and inform himself in the practice of our artificers, in order to return an answer.

A paper of Dr. PAPIN was read about the application of his digester to the baking of bread, as he had contrived it to turn like a spit†. He produced some bread baked after this manner, which seemed a little dough-baked, possibly for want of time.

Mr. FRANCIS LODWICK was sworn of the council.

Decemb. 8. Sir JOHN HOSKYNs, Sir CYRIL WYCHE, and Dr. GALE took the usual oath of vice-president of the Royal Society before the president and seven of the council, as likewise the oaths of allegiance and supremacy, according to the charter.

The president being withdrawn, Sir JOHN HOSKYNs took the chair.

Upon the reading of the minutes it was remarked, that cedar saw-dust was made use of for preserving the bodies of animals brought from the West-Indies.

Sir JOHN HOSKYNs observed, that he had heard, that the balm of Gilead, commonly sold for such, was the sap or juice of the eastern coniterous cedar, or cedar of Libanus.

Dr. GALE related the cure of a dropfy in two persons, well known to him, by the use of mustard-seed in their drink.

Dr. PITT said, that the usual method of vomiting and purging does not always succeed in the cure of rheumatisms; and that sometimes, on the contrary, the disease is more exasperated thereby.

Dr. ROBINSON said, that there were cubical grains of hæmatites found near Helmesley in Yorkshire.

Mr. HOOKE mentioned, that he had some such given him by Mr. WINTHROP, brought from New England, and which were true amethysts, and transparent.

Dr. ROBINSON remarked, that upon great rains it is a common thing in the Wolds and in Craven in Yorkshire, to have great eruptions of water out of the

\* Letter-book, vol. x. p. 544. A translation of part of it is printed in the *Philos. Transact.* N°. 186. p. 259.

† Register, vol. vi. p. 341.

sides of the hills; and that he himself had seen it spout two yards high out of the earth.

Mr. PAGET said, that about five miles S. W. from Kettlewell in Yorkshire, there is a lake, out of which, as by a jet d'eau, the water spouts out below, and becomes the head of the river Aar.

Dr. GALE mentioned, that there had been lately discovered a valuable copper-mine in the bishoprick of Durham, which was granted to the dean of Durham.

Mr. HENSHAW presented to the Society some of the roots of the asragalus sylvaticus, said in the *prolomis Scotiæ illustratæ* of Dr. SIBBALD to be used in Scotland to prevent hunger and weariness. It had a taste like liquorice, and grew plentifully on Hamstead-heath.

Mr. AUBREY produced a nautilus cast in the substance of the pyrites or vitriol stone, being of a brass colour, found in a chalk-pit.

Mr. CLUVERUS gave in an account of Mr. MOLYNEUX's *Sciotericum telescopicum*; which account was read, and ordered to be inserted in the *Philosophical Transactions*.

Mr. MEARES was elected a fellow.

Mr. WILLIAM MOLYNEUX's observations made at Dublin of the eclipse of the moon November 19, 1686<sup>a</sup> were communicated. The beginning of it was at 9 hours 25' or 27' somewhat dubious; the end accurately observed at 12 hours 4'; the quantity and duration agreeing exactly with the calculus of the ephemerides dedicated to the Royal Society.

Mr. HOOKE read a discourse of his, proposing several queries concerning shells and the like petrified substances found deep under ground and on the tops of hills, as nautilus, helmet-stones, and the like; and he produced very elegant figures of those substances drawn by himself.

A letter of Mr. WILLIAM COLE of Bristol, dated there Decemb. 3 1686<sup>b</sup>, was read relating to the purple fish, and accompanying seven several pieces of linen-cloth stained with the purple colour, and sent up for Mons. HUET, bishop of Soissons.

A proposal by way of address to the Society from Mons. CLAUDE BARDON, professor of the mathematics, was read, desiring their encouragement to proceed in a design of causing arithmetical tables to be engraven on copper for the ready working of multiplication, division, &c.

<sup>a</sup> N° 184. p. 213.

<sup>b</sup> They are printed in the *Philosoph. Transact.*

N° 185. p. 236.

<sup>c</sup> See his *Posthumous works*, p. 281. & seq.

<sup>d</sup> Letter-book, vol. x. p. 346.

Decemb. 15. Sir JOHN HOSKYNs vice-president in the chair.

Dr. HAVERS subscribed his name, and was admitted fellow.

Mr. HOOKE was of opinion, that the cubical grains lately shewn before the Society derive their figure from the coagulation of particles impregnated with a marine salt.

Upon mention of the eruption of water on the sides of the hills in Yorkshire, signor SAROTTI said, that it was a common thing to have such spouts in the hills of the kingdom of Naples.

Mr. HOOKE on this occasion mentioned the instance of the river Mole in Surrey, which goes under the hills at Dorking, and rises again at Leather-head, after the same manner as those springs in Yorkshire, where some extraordinary fall gives them the impetus, wherewith they break out.

Dr. SLOANE read part of a letter written to himself concerning a very impetuous hurricane near Montpellier about the 2d of October past, occasioned, or rather preceded by the collision of two clouds, one coming from the land, the other from the sea; whence without any thunder proceeded a flash of Lightning and a great hail, which was immediately followed by a most violent tempest of wind.

Mr. HOOKE read a farther discourse of his, by way of introduction to a theory of his concerning the petrified shells and such like substances found in the bowels of the earth, and on the tops of hills.

Mr. CLUVERUS presented from the author Mr. VAGETIUS the *Isagoge physologica* JUNGH, lately published by him.

He produced a book of Mons. MALLEMONT DE MESSANGE, intitled, *Le grand & fameux probleme de la quadrature du cercle resolu geometriquement par le cercle & la ligne droite*<sup>1</sup>; which book Mr. CLUVERUS said he had examined, and found the paradoxisms, which he promised to make out before the Society at their next meeting.

An extract of a letter from Rome to signor SAROTTI, dated Novemb. 16 last<sup>2</sup>, was communicated by him to the Society, containing the description of an urn lately discovered in a sepulchre by the late inundation of the Tiber; which urn, upon being opened, was found to exhale a very strong bituminous scent, and to have in it an oily substance contained in an earthen pot, which grew hard upon admission of the outward air. This was by some at Rome supposed to be one of those perpetual lamps mentioned by the antients.

<sup>1</sup> Printed at Paris 1686 in 12.

<sup>2</sup> Letter-book, vol. x. p. 348.

It is printed in the *Philos.*

*Transf.* N<sup>o</sup> 185. p. 227.

The latter part of Dr. REISELIUS's letter to Mr. HALLEY of October 8, was read, wherein, among other things, he excuses the not having tried sufficiently the effects of the Wirtemberg syphon, pretended by the inventor to be capable of evacuating water at the top thereof, and to run when above fifty feet high. This letter was ordered to be filed<sup>1</sup>, and answered.

Dr. PAPIN gave in a paper<sup>2</sup> mentioning, that there had been tried in Venice in signor SAROTTI's academy the experiment of a flint and steel *in vacuo*, which he said would not strike fire without the air. He now shewed the experiment before the Society, and having contrived to thrust down the trigger of a pistol in an exhausted receiver, it was found, that the fire, which followed the fall of the cock, was scarce perceptible; whereas when the air was admitted, the sparks thereof gave a vivid light.

Decemb. 22, the earl of CARBERY president in the chair.

Sir WILLIAM PETTY produced a defence of his *Essays in political arithmetic concerning the comparative magnitudes, wealth and people of London and Paris*; which defence was read, and he promised to lodge it with the Society.

Upon the reading of the minutes, Sir WILLIAM PETTY mentioned an instance of an hill in Ireland, out of which in wet weather there were great eruptions of water.

A paper of Dr. PAPIN<sup>1</sup> about shooting a spherical bullet by exhausting the air out of the barrel was read, and the experiment shewn: but by reason of the night, the fall of the bullet could not be seen, and therefore the experiment was ordered to be made some other time.

The earl of PEMBROKE informed the Society, that he had observed the iron plug used in Savoy to blow up rocks with gun-powder, to differ considerably from that in the repository, the cylinder of the former being split nearly in the diagonal; whereas the latter had only a small additional wedge.

Mr. HOOKE read a continuation of his discourse concerning shells, &c. wherein he gave several material instances to prove, that there have been very great changes in the earth's surface, as of rows of oystershells found in a cliff in the Alps, sea-fand and shells at a great depth in St. James's fields, and the like shells observed by himself at a great height from the sea in a cliff in the Isle of Wight.

A letter of Mons. JUSTEL was read concerning a curious relation of China, then printing in French at Paris; of the presents and embassy sending by the French king to Siam; and of several books lately printed, or then in the press at Paris.

<sup>1</sup> Letter-book, vol. x. p. 328.

<sup>2</sup> Register, vol. vi. p. 342.

<sup>1</sup> Ibid. p. 343.

A letter of Dr. WALLIS to Mr. HALLEY, dated at Oxford Decemb. 14, 1686<sup>n</sup>, was read, giving his sentiments concerning the reason of the trade winds, and accompanying the minutes of the Philosophical Society at Oxford of November 30, and December 7. His letter was as follows :

“ SIR,

“ Your’s I received of December 11, with the inclosed minutes of Nov. 24, and Dec. 1, and the two problems of Mr. NEWTON; all which I have communicated to our Society here.

“ The minutes we have ordered to be transcribed, and the original sent you back as you desired. And if you desire Mr. NEWTON’s papers to be returned, that shall be done also. By these papers of Mr. NEWTON, I find he hath considered the measure of the air’s resistance to bodies moved in it; which is the thing I suggested in one of my late letters, and thereby saves me the labour of doing the same thing over again. For I should have proceeded upon the same principle; that the resistance (*cæteris paribus*) is proportional to the celerity (because in such proportion is the quantity of air to be removed in equal times) nor do I know from what more likely principle to take my measures therein. His computation from this principle I have not yet had leisure to examine; but do presume, a person of his accuracy hath not failed in his computation or reductions from it. Upon reading that passage about the cubical grains of marsh-mallows, found in Yorkshire, it was suggested, that they are found in many other parts of England; and divers of them have been here shewed to us. They are known by the name of *Indus Helmontii*; and an account is given of them in Dr. PLOT’s history of Staffordshire. Concerning the monsoons and trade-winds; so good account as to matter of fact cannot but be acceptable; and the causes thereof worth inquiring into. Upon discourse thereof (at least to some of us) it seemed,

1. That the earth’s diurnal motion from east to west (whereby the air, if not fully keeping pace with it, will represent an easterly wind) is not wholly to be laid aside: (as likewise that of the water in order to the tide, first taken notice of by GALILEO). For though this alone does not answer all the phenomena, yet it goes a great way: and where this fails, we are to seek a subsidiary reason of such failure.

2. The other reason assigned, from the air’s rarefaction (by the vertical sun) whereby it becomes lighter, and thereupon the heavier, or less rarefied air rusheth in upon it to preserve the æquilibrium, seems to be a pursuance of the same notion with that of Doctor GARDEN, in his letter printed in the *Philosophical Transactions* (Numb. 175.) who there argues from the same principle.

3. But there is this difficulty in it, that the same notion may as well be urged (and perhaps stronger) for a west-wind, as for an east-wind. For while the rarefied air mounts upwards (as smoke and air in a chimney) and doth perhaps spread itself (above) over what is heavier and less expanded (which is that on the western not the eastern side) this western air (rather than the eastern) will (underneath) rush into the place of the rarefied air; in like manner as the air, which feeds the fire in a chimney. What else hath occurred to us of late, you will find in our minutes, which are ordered to be transcribed

\* Letter-book, vol. x. p. 349.

“ and sent with this. You may be pleased, with this to present my respects and  
 “ service to the Society; and particularly to the hon. our new president, to whom  
 “ I wish much joy and happiness in that employment. I am, Sir,  
 “ yours to serve you,

“ JOHN WALLIS.”

Dr. PAPIN shewed again the experiment of a flint and steel in an exhausted receiver, and the effect was as at the last meeting, viz. that though there was some light, yet it was exceedingly faint, and seemed only to be from the little quantity of air remaining in the receiver not perfectly exhausted.

An account was given in by Mr. CLUVERUS of the first book of Monf. MALLEMONT DE MESSANGE concerning the quadrature of the circle, wherein the author, to make the reader duly value his pretended discovery, gives a large history of the several attempts and miscarriages of the famous geometers both antient and modern in this subject; all whom, he would have it believed, he had out-done; and wondered that others, more able mathematicians than himself, should have mist the discovery. Mr. CLUVERUS promised against the next meeting a demonstration of the paralogism committed by this author in his pretended quadrature.

December 29, the earl of Carbery president in the chair.

The minutes of the last meeting were read.

Mr. HOOKE proposed, that it might be tried whether or no theamenta of steel struck off in the experiment of the last meeting of the pistol *in vacuo* be melted and vitrified, as is usually observed *in aere*, as may be seen in Mr. HOOKE's *Micrographia*. It was ordered, that Dr. PAPIN prepare this experiment against the next meeting.

Mr. HOOKE said, that steel-filings being cast through the flame of a candle are thereby melted or calcined; and that those, which make the most vivid sparks, catch fire and flame so as to ascend thereby: and he shewed this to be so by experiment.

He mentioned the experiment of driving out all the air in a vessel by the vapours of spirits of wine.

A letter of Monf. JUSTEL was read concerning a relation of the great extent of the empire of the Russians and a map of their territories, then in Holland.

On this occasion Mr. HOOKE remarked, that he had been credibly informed, that the tide of flood comes out of the east into a second streight more easterly than that of Weiggats; and consequently, that Nova Zembla is an island, and that there is a great ocean to the east thereof instead of the imaginary Tartaria magna.

U u u 2

The

The Earl of Pembroke observed, that he had read, that there were four floods and as many ebbs in each twenty four hours about Venice.

Mr. Hooke read a farther continuation of his discourse about shells, wherein he considered the structure of the nautilus and cornu Ammonis stone, tending to prove, that though it be true, that there is no animal known, resembling in all points the lineaments of those lately produced by himself; yet that it is not a sufficient argument to evince, that there is not nor ever was any such animal *in rerum natura*.

Sir WILLIAM PETTY gave in his two notes about the magnitudes of London and Paris, which were ordered with his leave to be printed in the *Philosophical Transactions*.

1684. Jan. 5, at a meeting of the COUNCIL were present

The Earl of Carbery president

Sir CYRIL WYCHE  
Sir JOHN HOSKYNs  
Sir EDMUND KING  
Mr. PITFIELD  
Mr. HILL  
Mr. HENSHAW

Dr. GALE  
Mr. CREED  
Mr. LODWICK  
Mr. WALLER  
Mr. HOOKE.

It was ordered, that Mr. WALLER, Mr. HOOKE, Mr. PITFIELD, and the two secretaries, or any two or more of them, be a committee to inspect the books of the Society, to see if Mr. HALLEY had performed his duty in relation to the entries to be made by him, according to an order of council of January 27, 1684; and

That Mr. HOOKE bring in against the next meeting of the council a proposal in writing of what he is willing to perform for the Society; and what he expects by way of gratuity from them: which he promised to do; and a meeting of the council was ordered to be summoned for this day sennight to consider of his proposal.

At a meeting of the SOCIETY on the same day, the Earl of Carbery president in the chair.

Upon the mention of the contraction of the distance between us and the East-Indies, Sir JOHN HOSKYNs supposed, that this discovery might help to account for the nearness of China and Mulcovy. In support of which Mr. HOOKE remarked, that he had good authority, that to the north of the China wall there is a great ocean at no great distance, and that the Great Tartary of the maps is wholly fabulous.

He gave an account of the tides and half tides observable in the isle of Wight between it and the main, viz. that the first of the flood comes in from the west

\* Vol. xvi. N<sup>o</sup>. 185. p. 237. for November and December 1686.

about the Needles ; But that after the flood is well made without, it comes in from the East. and runs through with a contrary stream to that, which it had in the beginning of the flood.

In order to prove, that the incredible bigness of the nautilus or cornu Ammonis stone is no argument, that there have not been such shell-fish of that magnitude, Mr. Hooke produced a quotation out of MANDELSLO's travels, wherein mention is made of an oyster, the shells of which weighed above 400 lb ; which shells were then in the Duke of HOLSTEIN's collection of rarities.

A note of Monf. JUSTEL was read, giving an account of a sort of little microscopes made at Rome by Campani, which were but three inches long, but which he pretended to be better than the biggest ever made by him ; and that the *animalcula in semine canino* are plainly visible therein.

Mr. HENSHAW presented to the Society a Venetian balloting box brought from Venice, and a cluster of twelve pine-cones, said by Dr. SLOANE to be of the *pinus maritima* CASPARI BAUHINI.

A paper of Dr. PAPIN \* was read concerning an experiment, which he was ready to make, in order to find the quantity of air produced by the firing of gun-powder *in vacuo*. The experiment was made in an exhausted receiver capable of holding 4½ lb. of water with 12 grains weight of gun-powder. Upon firing, the receiver, which was pretty thick, broke as with a blow from without ; for the piece was driven inwards, and would not pass out at the hole.

Mr. HOOKE conceived, that this proceeded from the pressure of the outward air, which alone was almost able to have broken the glass, which yet it could not do, till the shake given by the blast of the powder had given it, viz. the outward air, more force by its recoil. It was ordered, that this experiment should be prosecuted at the next meeting.

Sir WILLIAM PETTY produced three papers of his, being in answer to the objections of Monf. AUZOUT against his conclusion, that London is greater than Paris and Roan taken together. He permitted them to be read, and it was ordered, that Monf. JUSTEL's pleasure should be known with regard to the printing of an extract of Monf. AUTHOR's letter with the said answers of Sir WILLIAM PETTY.

A chart of the voyage of the French Jesuits to the East-Indies, wherein the longitudes of Siam and the adjoining parts were rectified, being produced, it was now shewn, that the said correction had been long since published in the *Philosophical Transactions*, particularly in February 1682, and after that in June 1683, where the very same rectification is to be found in two little treatises by Mr. HALLEY.

\* Register, vol. vi. p. 343.

Mr. HALLEY propos'd, that the best way to examine the ratio of the force of the magnet at several distances would be by considering the deflections, which the magnet plac'd at certain intervals would occasion in the direction of the magnetical needle from the meridian.

This experiment was order'd to be made.

January 12, at a meeting of the COUNCIL were present

The Earl of Carbery president

Sir JOHN HOSKYNs

Mr. CREED

Mr. HILL

Mr. WALLER

Mr. HENSHAW

Mr. LODWICK

Mr. PITFIELD

Mr. HOOKE.

It was order'd, that Dr. NATHANAEL VINCENT desiring to withdraw himself from the Society, for several private reasons of his own, have his bond deliver'd up.

Mr. HOOKE made a propos'al, that he would produce one or two experiments and a discourse at every meeting, provided his salary be made up 100 *l.* per ann.

Hereupon, after much debate, it was concluded, that Mr. HOOKE should have 50 *l.* a year from the Society, and their lawful assistance and recommendations towards his recovery of the 50 *l.* a year, which Sir JOHN CUTLER stood oblig'd to pay him during his life: and that in consideration thereof Mr. HOOKE should at every meeting produce one or two new experiments, together with a discourse concerning them in writing, to be left with the secretary: and that the said experiments should proceed in a natural method.

It was order'd, that Dr. PAPIN be paid a quarter's salary of 7 *l.* 10 *s.* due to him at Christmas last.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the last meeting were read.

Dr. COX produc'd several maps and discourses concerning the great lakes, which are in North America, which he affirm'd to have been survey'd by some Englishman, and found to be a great Mediterranean sea of above 500 miles round, and that it was highly probable, that the Sasquehannough river comes out of this lake, and that Delawar river comes within 5 or 6 miles of another, which certainly falls into the lake. Upon which Dr. COX propos'd, that an advantageous settlement for the beaver-trade might be made in these lakes. He likewise promis'd to give an account of the history of this discovery.

Dr. SLARE gave in a farther account of the stones sent from Berne, and said to have

have been voided by stool; viz. that he had calcined one of them in a strong reverberatory fire for a very long time, but found, that it would not be burnt to lime. He shewed the stone, which was burnt and very white, but would not dissolve upon putting into water, so that it seemed scarce probable, that so very compact a substance should be generated in *corpore humano*.

The time being far spent, Mr. HOOKE's lecture and experiment, as also those of Dr. PAPIN, were ordered to be referred to the next meeting.

January 19, the president in the chair.

Upon reading the minutes of the last meeting, and the mention, that the stones sent from Berne would not calcine, nor being burnt shew any symptom of being magnetical, as those calculi found in the bladder do; Dr. AGLIOSBY said, that these being voided *per anum* were most probably formed by concretions of the gall; and it so, they must necessarily be of a very different texture of parts from the calculi formed by the coalition of urinous salts in the bladder and kidneys.

A letter of Dr. WALLIS, dated at Oxford, January 14, 1687, was read, wherein he farther insisted on the diurnal motion to be a principal cause of the general or trade winds. The letter was as follows:

“ S I R,

“ Yours of January 1 I did (at our first meeting after our adjournment for the holidays) communicate to our company here; to whom it was very acceptable. “ As to that in the beginning of it, concerning the trade-winds and monsoons, “ you have certainly done very good service in giving so full an account of the “ matter of fact: which affords good opportunity for the inquisitive, to seek after the causes thereof: And as to these (though I list not to contend, but am “ willing to allow every one the liberty of their own sentiments) yet I am still of “ opinion, that (whatever other concurrent causes there are) that of the earth's “ diurnal motion, assisted by that of the annual and menstrual of the earth and “ moon, and the obliquity of both to the diurnal, are not to be excluded from “ an influence on the tides and trade-winds, (for reasons which I have elsewhere “ given) nor would I wholly exclude that other notion, which Dr. GARDEN and “ you pursue, of the air's rarefaction by the vertical sun. The objection from the “ monsoons strikes (at least) as hard against the latter notion, of an eastern “ blast from the rarefaction by the sun's meridional heat, as against the other from “ the diurnal motion, and must be accounted for from some other concurrent “ causes, and not from either of these singly. And the other objection, for a “ western rather than an eastern blast from such rarefaction, seems yet to me of “ weight. For if from a fire-hearth in the middle of a large hall heated air do “ move upwards, (as we find it doth;) the heavier air from all parts must needs “ rush in upon it; and on that side most (if any be) on which it is most heavy, “ and therefore most pressed: which is, in our present case, not that on the “ eastern side, (which was heated just before and is not yet cold;) but that ra-

Letter-book, vol. xi. p. 57.

“ ther

"ther on the western side, which is not yet heated: which should rather resemble a western than an eastern blast. What is argued from the sun's being vertical, at several seasons, sometimes on the southern and sometimes on the northern side of the equator, may as well be argued from the obliquity of the earth's diurnal motion to the annual. But these things I represent only, leaving it free for others to judge from thence as they shall see cause. Our minutes for some days will be sent with this, and some other things soon after as I can get leisure. This at present from yours,

"JOHN WALLIS."

This letter was accompanied with the minutes of the Oxford Society, wherein, among other things, mention is made of an extraordinary horn, that grew on the head of one MARY DAVIS in Cheshire; the circumference of the root of which was three inches  $\frac{7}{8}$ , and the length laid out straight was  $5\frac{1}{2}$  inches: likewise an account of very good ale brewed in Staffordshire with walnut leaves instead of hops, which tasted pleasant and kept very well: that Dr. BAGLEY had lately dissected an hedge-hog male and female: and that the grand Duke's diamond weighs 138 carats.

It was ordered, that in the next letter to Oxford some of the most remarkable particulars of the dissection of the hedge-hog be desired.

Upon occasion of the horn growing on the woman's head, Mr. LODWICK said, that he had seen a woman in London, who had a horn on her head wreathed like a ram's horn, the wreath of which was about an inch diameter.

A note of Monf. JUSTEL was read, wherein he mentions, that there had been found in Canada a mountain made up of lead and tin ore, that comes to the day, so that there is no need of mining for it.

A second note from him returned to the Society the thanks of Monf. HURT, Bishop of Soissons; for the samples of the English purple, which they had procured him from Mr. COLE. The Bishop in his letter to Monf. JUSTEL mentioned, that he had lately observed the crepusculum or time of twilight to be of a much longer continuance than usual, and desired to know, if the same had been observed here. In answer to which Mr. HOOKE said, that he had lately seen a glade of light in the morning such as is common in the evening in March and April; but that he had never observed the like before at this time of the year.

In the same note of Monf. JUSTEL mention was made of a way used by the savages in Canada for making several impressions on folds of a very thick bark of birch, by doubling them many times; and then gravings them all at once with teeth (suppose some instrument made of teeth) and then opening them again, the impression is multiplied as often as there are folds.

Upon this occasion Mr. HOOKE described a method for dying several colours on the same piece of cloth in pannels or squares, which he conceived to be the way used by the Indians to stain their calicoes.

Mr. Hooke read a farther lecture concerning the changes, that seem to have happened in the earth's surface, and proposed three queries, viz. 1. Whether the earth's poles are fixed in the earth, or not? 2. Whether the earth's surface be truly spherical? and 3. Whether all perpendiculars pass exactly through the same point or centre?

The experiment was tried of the ramenta of steel struck off by the fall of the cock of a pistol *in vacuo*, to see, whether they would be melted into small hollow globules, as they are *in aere*: and it was found, that they were only exceedingly thin plates of steel, which had not suffered the least liquefaction, as could be discovered on several of them.

January 26, the president in the chair.

The Earl of Pembroke having been formerly elected this day subscribed his name, and was admitted fellow by the president.

The minutes of the last meeting were read.

A letter of Dr. WALLIS was read, concerning the resistance of the medium to bodies projected through it, as likewise to the fall of bodies: and it was ordered to be printed in one of the next *Philosophical Transactions* <sup>4</sup>.

It was ordered, that Mr. NEWTON be consulted, whether he designed to treat of the opposition of the medium to bodies moving in it in his treatise *De Motu Corporum* then in the press.

It was ordered, that the thanks of the Society be returned to Dr. WALLIS for his respect to them in dedicating his *Logic* to them, and for the present of that book made this day.

Part of Mr. CLUVERUS's animadversions on the paralogism committed by Monsr. MALLENMONT DE MESSANGE in his pretended quadrature of the circle<sup>5</sup> was read.

A note of Monsr. JUSTEL was read, desiring the omission of the name of the person, who gave Monsr. AUZOUT an account of the number of houses in Paris, if the controversy between Sir WILLIAM PETTY and Monsr. AUZOUT should be printed.

An ephemeris for the year 1687, dedicated to the Society, was presented to them by Mr. HALLEY.

Mr. Hooke read a lecture, giving his hypothesis, how shells and such like substances come to be found deep in the earth, and far above the surface of the sea,

<sup>4</sup> N°. 186. p. 269. for January, February and March 1687.

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<sup>5</sup> Mr. CLUVERUS's animadversions are printed *ibid.* N°. 185. p. 245.

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as it is at present. He supposed, that the diurnal rotation of the earth by its *vis centrifuga* taking off part of the gravity formed the surface of the sea into a compressed spheroid; that is, that the diameter by the poles is the shortest, and those of the equinoctial greatest, which some experiments of the shortning the pendulum near the equator seem to make out. Then, if it may be supposed, that the poles and axis are moveable, the equinoctial and greatest diameter will be likewise altered, and by consequence the parts of the land, towards which the poles approach, will be raised, and the sea retire; but, on the contrary, those parts, from which the poles recede, will sink, and the water rise upon them: and that the poles may be altered, he endeavoured to prove by alledging the latitudes of several places considerably different from those assigned by PTOLEMY and the old geographers:

Mr. HOUGHTON presented a flat stone very light, found on the sea-side, resembling a biscuit-cake petrified.

Dr. PAPIN tried the experiment of firing gun powder *in vacuo*. He put six grains of gun-powder into his receiver, which held three pounds of water; and upon firing it was found, that the mercurial gage was risen five inches, or that the air produced made a pressure of about a sixth part of that of the whole atmosphere. Hence it was concluded, that the product of six grains of gun-powder would fill the space of about half a pound of water, that is, much about four grains of air<sup>f</sup>.

Feb. 2. Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the last meeting were read.

Mr. CLUVERUS presented to the Society the *Acta Eruditorum Lipsiensia* for the months of August, September, and October of the last year, 1686.

Dr. PAPIN presented his new book, intitled *A Continuation of the new Digest of Bones, its Improvements and new Uses it hath been applied to both at Sea and Land: together with some improvements and new Uses of the air-pump, tried both in England and Italy*.

Mr. BOYLE made the Society a present of six copies of Mr. WEIDENFELD's book, intitled, *Prodromus de Medicinis*.

A note from Mons. JUSTEL informed the Society, that there was lately printed at Paris the morals of CONFUCIUS, with a genealogy of the Kings of China, with other works of Father COUPLET the Jesuit, who had spent twenty years in that country: and that Signor CIAMPINI designed to publish the figures of all the Mo-saics, that he could procure, and desired to know, if there were any in England. The same note mentioned a discourse concerning microscopes and machines for managing long tubes, which Mons. JUSTEL expected soon from Rome; and that

<sup>f</sup> Register, vol. vi. p. 345.

Signor CIAMPINI intended to publish a sort of journal of what passed in the Roman academy.

Dr. PAPIN gave in a paper concerning the proof of the quantity of air produced by the gun-powder in the last day's experiment by help of a small mercurial gage included in the receiver: and he shewed by the experiment of the cane of a barometer included in a receiver, and pumped till it came to the level of the stagnant mercury, that when as much air was admitted, as raised the mercury five inches in the cane, the gage stood at the same point as in the experiment at the last meeting. Whence it was evident, that the conclusion then made was true, viz. that six grains of gun-powder yielded four grains of air.

Mr. HOOKE read a farther discourse concerning the probability of the hypothesis, that the earth is of the figure of a prolate spheroid, whose shortest diameter is the axis. He alledged several instances of assertions concerning the elliptic figure of the planets, as of the sun by SCHEINER, of Jupiter by CASSINI, and of Mercury by GALLET. He then proposed several experiments proper to examine this hypothesis, as by the vibrations of a pendulum-clock in places near the poles and near the equator; as also by trying, whether a degree of latitude be exactly equal in all parts of the world. Then he proceeded to enquire, whether the axis be fixt in the earth, or not; and among other queries, whether the vast sandy deserts of Africa and Arabia owe not their original to the sea? and whether there remain any antique buildings, wherein the true meridian should have been designed, such as the Egyptian pyramids, the Athenian temple of the winds, &c.? He concluded with a promise to produce at the next meeting a method capable of determining by observation the question of the mobility of the axis in a few years. To make it probable he alledged an experiment tried by himself, viz. that a ball being turned on its axis, as it swims on mercury, would change the axis of the rotation.

It was ordered, that the experiment be tried, whether phosphorus will catch fire *in vacuo*; if not, that then it be tried, whether it will burn by the help of air produced by the explosion of gun-powder.

February. 9, at a meeting of the COUNCIL were present

	The Earl of Carbery president,
Sir JOHN HOSKYNs	Mr. WALLER
Sir CYRIL WYCHE	Mr. PITFIELD
Mr. HILL	Mr. LODWICK
Mr. CREED	Mr. HOOKE

Sir JOHN HOSKYNs made a report of the state of the Society's books and papers, upon an inspection made by the committee, appointed for that purpose January 5th; which report was, that they had found the said books and papers in a very good condition; and the entries made according to order.

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It was ordered, that a committee of the Society, who will voluntarily meet once a week in Dr. POPE's lodgings, to consider of experiments and the correspondents of the Society, shall be allowed a fire and candle at the Society's charge: and

That Mr. HOOKE be desired to write to Amsterdam to a bookseller of his acquaintance there about the disposal of the *History of Fishes*; and that he agree for 400 books at 25s. a book, whereof two fifths to be paid in money, the rest in exchange of such other books, as shall be thought requisite for the Society's library.

Dr. SYLVIVS of Dublin was proposed a candidate by Sir JOHN HOSKINS, and was approved.

The president signed an order for paying the operator half a year's salary due January 14th, being 20*l*.

Upon consideration of a proposal made by Mr. HALLEY concerning the ascertaining of his salary, it was concluded, that the council would make it for the last year better than 50*l*: but that they could not at this time resolve on the quantum, by reason of the absence of Mr. HILL, the treasurer, who was now gone.

It was ordered, that Mr. HUNT do lay out the money for erecting a pole in the quadrangle of Gresham-college for the management of a telescope, the charge not exceeding thirty shillings.

At a meeting of the SOCIETY on the same day, the president in the chair.

The minutes of the last meeting were read.

Dr. SLOANE presented from the author, Dr. MAGNOL, his *Botanicum Montpelienfis* lately published; which Mr. EVELYN undertook to peruse and give an account of.

A note of Monf. JUSTEL was read, giving an account of a very odd effect of lightning on the chafs-windows of the cloister of the Bishop of Soissons, viz. that the fire had pierced them in several places with round holes like as if made with pistol-bullets, the glass not being cracked, but the edges of the hole melted and smooth: that these panes of glass, when rubbed, in order to clean them, fell in pieces like the glass-drops, which fall to powder as soon as any part is broken: and that, notwithstanding this, the fire had not touched the window shutter, which was but two inches behind the glass.

A paper of Dr. PAPIN was read concerning an experiment for trying the opposition of the air to a body moving in it<sup>a</sup>; wherein he proposed to find how much the air impeded the vibration of a flat plate suspended like a pendulum, by con-

<sup>a</sup> Register, vol. vi. p. 346.

paring the number of vibrations, wherein the said pendulum would fall from swinging an arch of 36 degrees to an arch of ten degrees both *in vacuo* and *in aere*.

THOMAS Earl of Pembroke was unanimously chosen of the council of the Society in the room of Mr. PACKER deceased, the members having been summoned, according as is prescribed in such case by the statute.

Mr. POVEY mentioned, that in Somerset-house in the lower gallery was kept an exceedingly antient ivory chair, supposed to be Roman, and that it was very intire.

Mr. HOOKE produced a demonstration of the spheroidal figure of the earth, proceeding from the complication of a gravity or descent towards the centre (which he supposed every way equal at the same distance *à centre*) and a *consuetudo à centre* or *vis centrifuga*, occasioned by the diurnal rotation of the earth, which is always in a line perpendicular to the axis, and proportioned to the cosine of the latitude.

He then proposed a method of finding nicely the true meridianline by means of a long telescope, which he explained by shewing how to be certain of the direction of such a long telescope; and then how to derive the horizontal base line from the hypotenuse given: by which exact observation he concluded it possible to determine, whether there were any change in the earth's axis more surely than by the coarse observations of the antients; and that if any such change be, it might, even in a few years, be by this means discovered.

Dr. PAPIN tried the experiment of the vibration of a pendulum *in vacuo* with a flat plain opposed to the motion; and it was found, that in 127 double vibrations the pendulum fell from 36° to 10°; and that the same pendulum *in aere* came to those terms in ten or twelve vibrations.

Feb. 16, the president in the chair.

The earl of PEMBROKE having been elected member of the council in the room of Mr. PACKER, took the usual oath.

The minutes being read gave occasion to discourse concerning experiments formerly made about the opposition of the air to bodies moving in it: and it was ordered, that the Journal-books be consulted, to see what had been done in that matter.

The Earl of PEMBROKE gave an account of an improvement in the water-level, whereby he could, he said, bring water with more certainty than by those, whole sights are telescopical.

A letter of Mr. WILLIAM MOLYNEUX, dated at Dublin Feb. 3, 1684, was read, mentioning a dissertation of his concerning the appearance of the sun near the

the horizon so much bigger than when he is much elevated, though they appear under the same angle. He affirms, that he had demonstrated, that the several solutions of this problem are unsatisfactory, and that he was willing to send a copy of this paper to be submitted to the Society's censure.

The same letter mentioned a very extraordinary excrescence growing in the brow of a girl in Ireland, resembling a cow's teat, occasioned by her mother, when big of her, being thrown down by a cow, as she milked it, and hit by the cow's teat on the same place, where this excrescence grew on the child\*.

The Earl of PEMBROKE related, that he had read in the *Recherche de la Verité*<sup>b</sup> the story of a child, whose mother having seen a man broke on the wheel, when big, was delivered of it, having as it were, a joint in all those places, where the malefactor had his limbs broken.

A letter of Monsr. WEICHARD VALVASOR from Carniola was read, promising to send the Society an account of what is observable in the lake of Zirknitz; and inclosing a map of Croatia accurately made by him, which was ordered to be procured to be engraven here.

Dr. PAPIN made the experiment of phosphorus *in vacuo*, to see, whether it would catch fire; and it was found, that when it grew warm, it became luminous, but did not fire gun-powder, that was upon it: but the air being admitted, it soon fired the gun-powder. It was ordered, that this experiment be repeated with a thinner plate; and that the experiment of the pistol *in vacuo* be tried, after that some air had been produced in it by the explosion of gun-powder, to see, if that nitrous medium be a fit pabulum for air.

There was read the relation of a new comet seen in September last in the sign Virgo, observed by Mr. KIRCH at Leipzig out of the *Alta Eruditorum* for Nov. 1686. It was direct about the 10th degree of Virgo, with about nine degrees north latitude.

Feb. 23, the president in the chair.

The minutes of the last meeting were read.

Mr. HALLEY read a paper of his concerning an experiment for finding the comparative force of a loadstone at several distances; which he conceived might be best obtained by observing the direction of an untouched needle in respect of two loadstones, whereof one to be always at the same distance, and the other to be removed nearer or farther at pleasure.

Dr. PAPIN gave in a paper about phosphorus *in vacuo*, and tried the experiment thereof; the success of which was, that the phosphorus in the air soon fired,

\* Register, vol. vi. p. 351. *Philos. Transact.* N°. 118. p. 334. for July and August 1687.

<sup>b</sup> By Father MALLEBRANCHE.

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but *in vacuo* it only sparkled, and sent forth a whitish vapour, which afterwards turned blackish. This vapour, as soon as the air was admitted, took fire, and went off in a flash.

Mr. Hooke shewed his manner of discovering the true meridian, by adapting a telescope so, as the direction of the sight therein should exactly answer to a line on the outside of the tube. Then directing this telescope towards a small telescopic constellation, called by him the English rose (which, he said, he had discovered just about the present pole-point, and wherein he formerly had marked the very point) and then letting fall two perpendiculars from the side of the tube, he concluded, that the true meridian would be most exactly designed; this method having the advantage of being to be put in practice at all times of the night, when clear, and these small stars to be seen with a two feet glass.

March 2, the president in the chair.

Mr. JOHN HARWOOD having signed the usual bond, and subscribed his name, was admitted a fellow.

Mr. CLAVEL, bookseller, made a proposal to the Society, desiring, that they would encourage the printing of Mr. BAKER's treatises. The Society promised, that several of their members would take the book, when printed, at 1*s*. 4*d*. a sheet, and as much each cut, to be printed in the same volume and character as the former book, intitled, *Clavis parabolica*, and in one language only.

It was ordered, that the manner of finding the meridian by help of the small telescopic stars about the pole point be tried at night after the next meeting.

A letter of Mr. NEWTON was read, mentioning his having sent up the second book of his mathematical philosophy.

An account of an experiment made by Mr. HALLEY for finding the proportion of the decrease of the magnetical virtue was read: and it was ordered, that that argument be prosecuted, and the result published in the *Philosophical Transactions*.

A paper of Dr. PAPIN was read concerning the quantity of air produced *in vacuo* by the explosion of gun-powder; and proposing the experiment of a jet d'eau *in vacuo*, to see how much the water therein would rise higher than *in aere*; or what is the opposition of the air to water<sup>b</sup>.

March 9, Sir CYRIL WYCHE, vice-president in the chair.

The experiment of finding the meridian line by the means of the telescopic stars very near the pole was by reason of the cloudy weather deferred till the next meeting.

<sup>b</sup> Register, vol. vi. p. 347.

Mr. EVELYN returned the *Botanicum Monspeliense* of Dr. MAGNOL, which had been recommended to his perusal.

It was ordered, that RAUWOLF's travels having been lent to Dr. DANIEL COX out of the Society's library above two years should be demanded of him.

A letter of Dr. WALLIS to Mr. HALLEY, dated at Oxford March 4, 1687<sup>1</sup>, was read, containing a farther illustration of his calculus of the opposition of the air to projects; together with some reflexions on Mr. HOOKE's hypothesis of the mutability of the poles of the earth\*.

On this occasion, there was read a paragraph of Mr. NEWTON's mathematical philosophy<sup>4</sup> concerning the direction and position of the axis of a globe turning about itself, and shewing, that by the addition of some new matter on one side of a globe so turning, it shall make the axis of the globe change its position, and revolve about the point of the surface, where the new matter is added. It was thought, that the same translation of the axis might be occasioned in the globe of the earth by the blowing up of mountains by subterraneous fire.

Dr. SYLVIVS of Dublin having been formerly proposed and approved, was chosen a fellow.

Mr. POVEY presented to the Society a tiffue of feathers in manner of a mantle and the pizzle of a sea-tortoise, said by LIGON in his *History of Barbadoes*, p. 118. to be of very great virtue in the cure of the stone.

Dr. SLOANE presented a vegetable substance growing in the sea, called by the Irish *Dulsek*, but by him *Fucus membranaceus*. It was reputed, to be very good for the scurvy, and for that purpose usually chewed by the Irish.

Mr. HOOKE read a lecture concerning the figure of the atmosphere, which he conceived to be of a shape much more oval than the water; both because gravity is weaker under the equator than under the poles, whereby the air becomes more expanded there than here; as likewise upon the account of heat and cold, the said difference is still more considerable. From the prosecution of this notion he promised to explain the causes of several phænomena seeming of great difficulty, particularly those of the trade-winds.

Dr. PAPIN gave in a paper, shewing, that upon trial of the experiment of a jet d'eau *in vacuo*, the water in the jet had, contrary to his expectation, risen less high *in vacuo* than *in aere*°. He was prepared to shew the experiment, but the time being spent, it was deferred to the next meeting.

March 16, there was no meeting, because neither the president nor any of the vice-presidents were present.

<sup>1</sup> Register, vol. vi. p. 53.

<sup>4</sup> Propos. 66 Cor. ult.

<sup>°</sup> Register, vol. vi. p. 348.

March 23. Sir CYRIL WYCHE vice-president in the chair.

Upon reading the minutes of the last meeting, it was the opinion of the members now present, that the protrusion of mountains by subterraneous fire or otherwise may occasion some alteration of the poles of the earth, as well as the accession of new matter.

An extract of a letter of Mons. HUET, Bishop of Soissons, concerning purple was read, wherein he acknowledged the purple discovered by Mr. COLE to be a sort of the true purpura of the antients, and to have all the marks thereof.

Dr. AGLIONBY produced a letter, dated at Tholouse, Dec. 4, 1686, and written by Mons. VEAY, physician there, to Mons. DE ST. USSANS\*, concerning a very uncommon hermaphrodite, who was in the habit of the body wholly female, but had a penis of a very considerable magnitude, the common passage of urine, semen, and the menstua.

Dr. PAPIN produced the description of an engine for applying the weight or pressure of the air for pressing cyder or the like†.

Mr. HOOKE produced a book intitled *New England's Rarities*, printed at London, 1672, in 8vo. In this, p. 37, mention is made of a scarlet muscle in that country at a place called Paschataway about fifty leagues east from Boston, where in a cove called Bakers-Cove is a sort of muscle with a purple vein, used in that place to mark shirts, handkerchiefs, and other linnen.

There were read out of the *Nouvelles de la Republique des Lettres* for Dec. 1686, the objections of Mons. NUIS against Dr. PAPIN's engine for raising water, grounded on the unequal lengths of the pipes, whereby the water should rise faster in the one than in the other; and secondly from the great quantity of air, that must be rarefied to raise water to a considerable height, especially if it lie upon a great inclination.

Dr. PAPIN's answers to these objections were read, wherein he endeavoured to obviate those difficulties, by shewing how to avoid the former: and as to the latter, he computed what force and pipes are necessary to make the rarefaction requisite to carry water to the distance of 12000 feet; though he remarked, that he proposed to great a distance with some diffidence, using the word *perhaps*.

The Society adjourned their meeting to Wednesday, April 6th.

1687. April 6, Dr. GALE vice-president in the chair.

After the minutes of the last meeting were read, the third book of Mr. NEWTON's treatise *De Systemate Mundi* was produced and presented to the Society. It

\* Letter-book, vol. xi. p. 62. It is printed in the *Philos. Transact.* N°. 186. p. 282.

† Register, vol. vii. p. 1.

\* Ibid. vol. vi. p. 348.

contained the whole system of celestial motions, as well of the secondary as primary planets, with the theory of comets; which he illustrates by the example of the great comet of 1682, proving that, which appeared in the morning in the month of Nov. preceding, to have been the same comet, that was observed in Dec. and Jan. in the evening.

Upon the mention of shell-fish yielding a purple juice, Dr. ROBINSON said, that Dr. LISTER had discovered several sorts of land-snails having a like tinging juice.

Dr. GALE reported, that he had lately received a letter of thanks from the authors of the *Alta Eruditorum Lipsiensia* for the *History of Fishes* sent them as a present from the Society.

It was ordered, that Mr. HUNT provide some oysters, to see, whether in a microscope there could be found any such animalcula, as are reported to be in the liquor of oysters from a letter of Mr. LEEWENHOECK printed in the *Bibliothèque Universale*.

A letter of Mr. LEEWENHOECK, dated at Delft, April 4, 1687, N. S. concerning the structure of the teeth, was produced, and ordered to be translated against the next meeting.

A large discourse of Mr. WILLIAM MOLYNEUX was read, concerning the apparent magnitude of the sun and moon\*, which seem much bigger than is usual, when they are near the horizon. In it the author designed to shew the absurdity of the several attempts to account for this odd phenomenon, and desired the opinion of the Society thereupon. It was ordered to try, whether it be really true, that the angle of the sun's diameter, when rising, is not greater than the same diameter, when the sun is considerably high.

Dr. PAPIN promised to bring in at the next meeting a model of his cyder-press, and produced some green-pease preserved *in vacuo* ever since the last spring<sup>b</sup>. They had contracted something of a rancid taste, but were otherwise well preserved.

Mr. HOOKE shewed a method of finding the latitude of places by help of a planisphere of the fixt stars, drawn after the gnomonic projection. It was by finding two stars in the same azimuth, and two others in some other azimuth about ninety degrees from the former, at the same instant of time. Then drawing lines on the planisphere through each pair of those stars respectively, the common intersection of those lines will shew the latitude of the place by the declination of the point of intersection on the planisphere. He promised to shew at the next meeting how this method might be made more general by solving this problem: two stars come on a certain azimuth, and after a given space of time two other

\* Register, vol. vii. p. 54. It is printed in the *Philosoph. Transact.* N° 187. p. 314.

<sup>b</sup> Ibid. p. 3.

stars come on some other azimuth: the latitude of the place of observation is required.

April 13. Sir JOHN HOSKYNs vice-president in the chair.

There was produced a deputation under the hand of the president constituting the Earl of Pembroke vice-president of the Society.

After the reading of the minutes Mr. HOOKE shewed a construction of the problem of finding the latitude of a place by the help of two azimuths of two stars and the interval of time between them; which being too intricate to be understood upon reading, he was desired to give it in at the next meeting in writing.

There were produced some grains resembling wheat sent to the Society from Mr. BOYLE. They were said to be fallen in rain in Wiltshire, and taken by the vulgar for wheat. They were bitter, and on the out-side covered with a loose husk or skin, that was intire. The inside seemed made up of very small grains. Mr. WALLER undertook to examine them microscopically, and make a report thereof.

Mr. HOOKE remarked, that formerly such grains seeming to have fallen in rain had been inquired into, and found to be no other than ivy berries: and such he supposed these to be.

Part of Mr. LEEWENHOECK's letter of April 4, N. S. was read concerning the structure of the teeth, which he found from microscopical observations in all animals to be made up of bony vessels and pipes, which all take their rise from the inside or cavity of the teeth; and that all these vessels have their particular blood-vessels, that feed them, and convey nourishment to them. And the obstruction of these bony pipes he conceived to be the cause of the rotting of the teeth and the exceedingly acute pain of the tooth-ach. The rest of the letter was ordered to be translated.

It was hereupon suggested, that the inoculation of the veins into the arteries might best be discerned in the vessels, that enter the bones; for that those of the flesh, when they become very small, are wholly lost in the parenchyma.

A paper of Dr. PAPIN<sup>e</sup> was read, wherein he concluded upon experiment, that the air produced *in vacuo* by the firing of gun-powder will not suffice to maintain fire; for that in a receiver, wherein he had fired three grains of powder by the sun, which yielded about  $\frac{1}{17}$  of as much air, as would have filled the receiver, he found, that in a very dark room no sparks of fire were produced upon the fall of the trigger of a pistol.

He produced the model of his cyder-press, which was contrived to apply the

<sup>e</sup> Register, vol. vii. p. 4.

weight of the atmosphere to a press; and the use thereof was shewn to the satisfaction of the Society.

There was given in a printed paper in Italian, published by the *Accademia fisica-matematica di Roma*, concerning some improvements and contrivances for microscopes and telescopes. It was ordered to be read at the next meeting.

April 20. Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting, Mr. HOOKE intimated a method, whereby he could more easily find the latitude of a place by observation of two azimuths of twice two stars and the interval of time between, which he shewed to be general as well in the stereographic as the gnomonic projection. It consisted in changing the right ascensions of one pair of the stars as much as the heavens move in the time between the two observations, and then proceeding as if the two azimuths had been observed at the same moment of time.

Mr. AUBREY produced some seeds or grains like wheat, said to have fallen in rain in Wiltshire at a place called Chalk. They differed from those produced at the last meeting, being somewhat bigger and reddish, and their taste not so bitter.

Mr. COLE of Bristol presented to the Society several fair samples of his purple on linnen.

He sent likewise an account of the supposed wheat said to have been rained in Wiltshire, which, he observed, he had by several trials found to be no other than ivy-berries<sup>a</sup>; agreeing herein with what had been concluded at the last meeting.

A paper from Monf. JUSTEL was read concerning the inscription lately found at Rome, and published in N°. 183 of the *Philosophical Transactions*. It came from Monf. AUZOUT, and was chiefly his remarks upon Dr. VOSSIUS's interpretation of that inscription, from which he dissented in many particulars.

Mr. HOOKE shewed a reflecting telescope made to take in several degrees. This he proposed as a very proper instrument to discover the true pole point among the telescopical fixt stars.

Dr. PAPIN produced some gooseberries, which he had preserved for a year *in vacuo* with a small quantity of sugar. They had been scalded soon after the air had been pumped out of the vessel.

There was introduced to this meeting by Dr. CLENCH a Lancashire gentleman, THOMAS BROTHERTON, Esq; who presented a branch of Scots fir or pine, which he had caused to be barked in the middle quite round; and the effect was, that in a

<sup>a</sup> It is published in the *Philos. Trans.* N° 186. p. 281.]

year's time the wood above the place, where the bark was taken off, was grown exceedingly, above twice what could have been expected, if it had not been barked; but that the under-parts were not grown in the least. Hence it was evident, that the sap rises in the inner parts of the wood, and returns by the circumference and the vessels of the bark, where likewise the accretion of the new wood is made. Mr. BROTHERTON affirmed, that by an artifice drawn from this and the like experiments he could increase the growth of a tree beyond any skill yet known; which method, he conceived, might be of great use in the propagation of fruit-trees.

Sir JOHN HOSKYNs gave his opinion, that the leaves of trees serve to imbibe the air, and may in some sense be said to be the lungs of trees.

*April 27.* Sir JOHN HOSKYNs vice-president in the chair.

Mr. HOUGHTON presented some very large acorn cups, brought out of Syria, and called by the Italians *calanie*. They were said to be used in Venice, both acorns and cups, by the diers to die black.

He presented likewise a monstrous chicken hatched with four legs at Godalmin in Surrey.

Mr. HOOKE remarked, that he had seen such a large fort of acorns, brought out of Barbary near Tangier.

Upon reading the minutes of the last meeting, Mr. HALLEY related, that he had seen at Edmonton in Mr. HUXLEY's orchard a codling-tree barked all round the trunk for above six inches space, which yet lived, and had recovered a new bark, that on one side joined the old, and began to approach it all round.

The latter part of Mr. LEEWENHOECK's letter of the 4th of April was read, wherein he farther prosecuted the inquiry into the make of the teeth of several animals.

Sir JOHN HOSKYNs proposed, that it might be duly examined, what becomes of the swallows, and in what state they are during the winter. In answer to which Mr. HENSHAW affirmed, that the chancellor of Denmark told him, as an undoubted truth, that in Iceland there had been taken out of the ice swallows, which being afterwards brought into a warm stove recovered and flew about the room.

A paper of Dr. HAVERS was read, wherein he gave an account of experiment, which he had made, by injecting a quantity of milk and water tinged with indigo into the intestinum rectum of a dog, to try, whether it would pass the valve at the termination of the ileon:

And the success was, that it had passed near a yard beyond the said valve; from which he concluded, that copious clysters may in many cases be very  
usefully

usefully applied, as well for correction of the mafs of blood, as in colic and iliac paffions.

It was ordered, that it be inquired of Mr. LEEWENHOECK, whether he could discover any animalcule in the cicatrix of an egg; and that he be desired to inform the Society about what time of the year he made his observations, of the liquor of oysters being full of animals.

Mr. HOOKE shewed again the scheme of the construction of the problem of finding the latitude by azimuths of twice two stars.

Dr. PAPIN gave in a paper concerning an experiment, which he had made of distillation *in vacuo*\*; and shewed some water of limon-peels so distilled. The scent thereof was found to be very strong and good, but the water was nearly insipid.

May 4. Dr. GALE vice-president in the chair.

Upon reading in the minutes of the last meeting the account of the fir-branch given by Mr. Brotherton, Dr. ROBINSON remarked, that the Straßburg turpentine issued from the picea, the Marfeilles turpentine from the pinus maritima, that of Venice from the larix, and that of Scio from the terebinthus.

Mr. HENSHAW observed, that he had an account like the former concerning swallows from our watermen, viz. that they have found them in the river Thames; and that towards the end of the year they assemble in great numbers on the little islands of the river, and then submerge themselves in the water.

Dr. GALE said, that mackerel are blind at their first coming, and have a film over their eyes; but that in the heat of the summer they see, and may be taken with a hook, whereas at first they are only to be caught with nets.

Part of a letter of Mr. LEEWENHOECK of May 9, 1687, N. S. was read, containing some microscopical observations on the structure or constituent parts of the mealy pabulum of plants, included together with the embryo plants in the husk of the seed. This he had found in the kernel of a medlar-stone to consist of nothing else but conglomerated globules. The rest of this letter was ordered to be translated.

Dr. PITT said, that having taken the yolk of an egg before it was covered with the white, he had frequently seen the cicatrix therein.

A paper was read, communicated by Dr. GALE, and said by him to have been copied by Mr. HOLLIAR the surgeon from the original of Dr. HARVEY, containing several anatomical remarks made by him of the phenomena proving the cir-

\* Register, vol. vii. p. 5.

culation of the blood, and others hinting the use of the viscera. This paper was ordered to be filed up and preserved<sup>f</sup>.

" 1. All the blood in the body passeth twice within one hour through the heart, and through the lungs: through the heart to receive vivacity, and new spirits; through the lungs to receive a temperament of heat.

" 2. The panting of the heart is but the pumping about of the blood, in the expansion receiving, and in the contraction sending it out; and it receives so much at every expansion, that considering the great proportion, and the many beatings of the heart in half an hour, it must of necessity come round about.

" 3. All the blood comes to the heart by the veins, and is sent from it to the arteries; for there are many little valvule in every vein, which open to the heart, but none from it, which is a demonstration to the sense of this position.

" 4. The passing of the blood through the artery upon the contraction of the heart is the cause of the pulse, together with the spirits, that come with it.

" 5. The veins in the body have several names, yet have they a general connexion, as if they were truly but one; for blow the umbilical vein of a dead child born, and all the veins in the body will presently swell, and be filled with wind.

" 6. Every artery runs at last into a vein, and so sends back the blood into the heart.

" 7. The reason we find little or no blood in the arteries after men's death, is because they have no valvule to retain it, and so it slides through in the veins.

" 8. The reason our bladders hold wind after our death, which let in water before, is, because those various meanders, like the top of a young vein, that run between the two membranes are shut up, and contracted by death.

" 9. The kidney is full of little teats, by which the water drops into the ureters, and when the stone begins to increase, then those teats begin to excoriate, and being very sensible parts, are the chief cause of the pain in the body of the kidney.

10. " It was a custom at their antient matches of drinking, to take every one an egg in his hand, and not to stir, untill they could hatch their eggs in their hands by the extraordinary heat.

" 11. The liver doth not give tincture unto the blood, but rather blood discolours the liver, for we find it blood in the meseraic veins before it comes to the liver. And I have seen perfect blood in an egg, before there hath been any liver.

" 12. The liver and spleen do not differ in substance; only the great quantity of blood in the spleen, and more corrupt blood, makes it to look somewhat bluer.

" 13. As the first concoction comes to the liver, so what is left of that concoction in the stomach, as yet crude, and what hath passed beyond the first concoction into the upper part of the gut, is laboured by the spleen, and by it prepared for the liver.

<sup>f</sup> Register, vol. vii. p. 88.

- " 30. The brain is divided juſt in the middle with a membrane, which they call ſuth : no part of the body is ſo full of veins, as the brain.
- " 31. The membranes about the brain both dura and pia are called matres, becauſe all other membranes in the body are derived from them.
- " 32. The omentum or caul is to keep the guts in due order, when we ride, or ſtir, left they ſhould twiſt, or knit, and ſo there could be no paſſage for the excrement, which would be preſent death.
- " 33. I have ſeen a man's ſpleen on the right ſide removed with the hand, with much art and labour, in his proper place.
- " 34. No creatures in proportion have ſo great a ſpleen and brain, as a "man."

Mr HALLEY gave an account, that he, together with Mr. HOOKS, had obſerved in Gresham-college the ſolar eclipse on the Sunday preceding, May 1, viz. that it was notably begun at 1 hour 17½ min p. m. and that the juſt end was at 2 hours 3 min. that the greateſt chord of the eclipsed part of the ſun was but 9½ min. or about 36 deg. of the ſun's limb; and conſequently the greateſt eclipse was juſt 1½ min. in the ſun's diameter<sup>a</sup>.

A paper of Dr. PAPIN<sup>b</sup> was read, giving an account of an experiment, which he had made to try, whether the ingredients of gun-powder might be found after exploſion *in vacuo*. Trial being made before the Society, it was found, that the parts were ſo diſperſed by the blaſt, that nothing could be concluded.

May 11, Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the laſt meeting, Mr. HENSHAW remarked, that Dr. HARVEY had conſidered the ſtate of ſwallows in the winter, and had diſſected ſome of them, which had been found under water, and could not obſerve, that there was either warmth or motion in them.

It was ordered, that it be inquired from Sweden and the Sound, whether there be no fluid blood to be found in thoſe frozen ſwallows, which are ſaid to revive there upon being brought into a warm ſtove.

Mr. CHETWYND of Ingſtree in Staffordſhire being preſent obſerved, that during the time, that the ſwallows are laid up for the winter, they moult, and return in the ſpring with all new feathers.

A note of Monſ. JUSTEL was read, giving an account of a glaſs-houſe in Paris, where they make a ſubſtance reſembling excellent China-ware; and that there was a certain perſon well-ſkilled in plants ſent over to the Antilles by the French King's order, to collect and ſend to France the plants and other rarities of thoſe iſlands.

<sup>a</sup> *Philoph. Transact.* No. 189. p. 370. for September and October 1687.

<sup>b</sup> *Regiſter*, vol. vii. p. 6.

This note inclosed the *Nouvelles de la Republique des Lettres* for the months of February and March 1687.

Sir ROBERT GOURDON produced a certificate under the hands of the commissioners of the navy of the great effect of certain pumps of his contrivance :

That his small pump managed by four hands filled a vessel containing two tuns in one minute and forty five seconds :

That the ordinary hand-pump, at the same hight, with four hands filled the same vessel in six minutes :

That his larger pump managed by twelve surveyors filled the same vessel in thirty one seconds, and by twelve seamen in thirty six seconds :

But that the ordinary chain-pump managed by six seamen did not fill it in less than four minutes.

A paper was given in by Dr. PAPIN concerning a way of distilling oil of sulphur *per campanam*; for which purpose he conceived, that the engine, which he had formerly shewn for the keeping of fire under water, might with some little alteration be very proper<sup>1</sup>.

A letter of Dr. WALLIS to Mr. HALLEY, dated at Oxford April 26, 1687<sup>2</sup>, was read, chiefly relating to the apparent magnitude of the sun or moon, which seem so much bigger near the horizon, than when they are considerably high. This the doctor concluded to be an optic fallacy proceeding from the eye's judging those objects, that are high, to be nearer; and consequently appearing under the same angle, they are esteemed to be so much lesser as they seem nearer.

Mr. HOOKE read a farther discourse concerning his manner of finding the latitudes of places by the azimuth of twice two stars.

Mr. BROTHERTON gave in a paper<sup>1</sup> with some figures relating to his experiments of the barking of trees. It contained three propositions, which he supposed, that he had demonstrated; viz.

1. That the sap (most of it, if not all) ascends in the vessels of the ligneous part of the tree, and not in the cortical part, nor between the cortical and ligneous part.
2. The increase and growth of a tree in thickness is by the descent of the sap, and not by the ascent: and if there were no descent, a tree would increase but very little, if at all.
3. That there is a continual circulation of the sap all the summer season, and during such time as the sap is stirring, and not a descent at Michaelmas only, as some have held.

May 18, Sir JOHN HOSKYNs vice-president in the chair.

<sup>1</sup> Register, vol. vii. p. 6.

<sup>2</sup> Ibid. p. 68. The latter part of this letter

is printed in the *Philos. Transf.* N<sup>o</sup>. 187. p. 323.

<sup>1</sup> It is printed *ibid.* N<sup>o</sup>. 187. p. 307.

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The minutes of the last meeting were read.

An experiment was shewn by Dr. PAPIN of shooting by exhausting the air out of a barrel, to see the difference between shooting a bullet and a cylindrical slug, after this manner<sup>1</sup>. And it was found, that the barrel being placed horizontal at three feet ten inches above the floor, the spherical bullet ranged forty seven feet two inches, and the slug, which was a cylinder of the same diameter and height with the bullet, no more than thirty seven feet.

Mr. HOOKE read a discourse concerning vegetation grounded on the experiments and observations of Mr. BROTHERTON, and explaining his three propositions given in at the last meeting. Mr. HOOKE promised to insert this discourse in the *Philosophical Transactions*.

He read a farther discourse concerning his hypothesis of the mutability of the earth's poles, which he found confirmed by an observation of ERASMUS BARTHOLINUS (*Art. Med. Hafn.* 1671 & 1672. cap. 127. p. 220.) who together with Mons. PICART observed at Uraniburg the angles of position of the neighbouring places with the meridian, and, as he said, found them very different from the same angles settled by TYCHO BRAHE about an hundred years before.

Sir ROBERT GOURDON delivered to the Society by the King's order a receipt to cure the bite of a mad dog<sup>2</sup>, being under the hand of Mr. THOMAS FRAZIER, his majesty's chirurgion. The chief ingredient of this medicine was a plant, which grows plentifully about Thetford, and is there called *the star of the earth*.

A stranger then present gave an account, that alum being powdered and put into water would cause any mud or sediment in water presently to subside.

Sir JOHN HOSKYNs remarked, that bitter almonds would do the same thing as alum.

Sir ROBERT GOURDON related, that Dr. PLOT had lately proposed to the king the barking of all timber, designed for the use of the navy, in the spring, and then to let the trees stand so barked till autumn before they are felled<sup>3</sup>; which he conceived would very much harden the wood, and make it much more durable by drying and evaporating the sap during the same. This Sir ROBERT GOURDON said was the practice of the French in felling their timber; but he knew nothing of the effect.

May 25. Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting, Mr. BROTHERTON's experiments occasioned much discourse about vegetation and grafting.

<sup>1</sup> Register, vol. vii. p. 16.

<sup>2</sup> N<sup>o</sup> 187. p. 307.

<sup>3</sup> Register, vol. vii. p. 8. It is printed in the

*Philos. Transact.* N<sup>o</sup> 187. p. 298.

<sup>4</sup> Register, vol. vii. p. 8. See Dr. PLOT's

Natural History of Staffordshire, p. 382.

Mr. HOOKE remarked, that Mr. BROTHERTON had cut on the bark of a fir-tree, which in time healed up again; and that the bark and tree throve, though all the direct fibres of the bark were divided; which seemed to argue insertions or anastomoses in the vessels of the bark, whereby the sap descends.

Sir JOHN HOSKYNs said, that it was a receipt to cure a tree of a cancer, first to cut it to the quick; then wash it well in vinegar and gunpowder, and so wrap it up in cow-dung, which will heal it, and make it grow well again.

Mr. HOOKE remarked, that Mr. BROTHERTON had observed, that seeds suspended in the air no sooner had emitted their germ out of the husk but it immediately turned upwards against the perpendicular.

Dr. GALE mentioned, that there was in Caius-college library in Cambridge a manuscript of one GODFREY WINSALL OF VINOSALVO treating about grafting of vines, as ancient as King RICHARD II's time.

Mr. HOOKE read a discourse concerning a suspicion of his, that the earth being made up of heterogeneous parts may have some inequality in the diurnal rotation from the different actions of the sun and moon; and he proposed an experiment to try it, by observing the interval of time between the passages of two stars having the same declination through a fixt telescope at several times of the same night. In the same discourse he supposed the reason of the moon's keeping one face always towards the earth to be, because this hither side of the moon is heavier than any other, and thereby gravitating most towards the earth, that part is always, except a small oscillatory motion, turned towards us.

A letter of Mr. LEEWENHOECK's was read concerning coffee, first as to the growth and texture of the coffee-berry, wherein he found very much oil to be contained; in which oil he conceived the principal virtue of the coffee to lie; and prosecuting that notion he gave direction for roasting the berry, and making coffee drink alter the best manner. In the conclusion he said, that the coffee-berries grow on a tree as big as our lime-trees, as he had been credibly informed.

Dr. AGLIONBY was of opinion, that coffee could not be an enemy to the nerves, unless in those, who use much drinking of wine, he having observed, that coffee will put wine into a great ferment.

Mr. HOOKE supposed, that the roasting of coffee is a sort of malting thereof to make it give its tincture; and that without roasting it would not make coffee.

June 1, there was no meeting for want of a vice-president.

June 8, Sir JOHN HOSKYNs vice-president in the chair.

Sir JOHN HOSKYNs observed, that in an oak-tree the small under branches would be killed and rot off by the droppings of the upper boughs on them; and

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yet the places in the trunk would so heal up, that there should be no sign in the grain of the wood, that ever there had been such a branch in that place.

He remarked likewise, that he had been informed, that in grafting the best way was to insert the grafts obliquely; in which case they would not fail to grow, the barks in some part or other being sure to coalesce so as to make the union necessary for the growth.

TWO notes of Mons. JUSTEL were read; the one <sup>b</sup> concerning a chart of the eastern parts of Muscovy bordering on China, to be expected from Holland, and desiring the election of Mr. NICHOLAS FACIO into the Society: the other about a new contrivance of Mons. DE LA HIRE to find the variation of the magnetical needle; and to ease the great difficulty of finding it at sea; and giving an account, that there was to be expected from Paris the translation of an history of China out of the Portuguese, wherein there was an exact plan of the city of Peking made to a scale, whereby it appeared, that it was much less than Dr. VOSSIUS imagined.

Mr. HOOKE read a discourse concerning a method of finding the interval of time to the utmost exactness, by shewing how to divide the time of each vibration of a pendulum into its parts: and he shewed the model of an instrument for the doing thereof. This he conceived might suffice to examine the query, which he moved at the last meeting, about the unequal rotation of the earth.

Dr. SLOANE related, that there was in London a certain person having the disease Phthiriasis: that he used to be sick, whenever the tumors producing lice struck inwards to his stomach, but that upon the breaking out of the lice he grew well again.

Mr. HENSHAW remarked, that FRANCESCO REDI had well observed, that there is a particular sort of louse or insect bred out of all sorts of animals and plants; and that his carps, when decayed and sick, had a kind of lice growing on them.

Part of a letter of Mr. LEEUWENHOECK was read concerning the growth of gall-nuts, which he found to be excrescencies of oak-leaves occasioned by the laying the eggs of a sort of flies on those leaves, which coming to hatch gnaw the ribs or vessels of the leaves, out of the gleeing moisture whereof he conceived these galls to be produced; and that within them there is commonly found a dead fly or worm ingendered therein.

Mr. HOOKE produced a book, intitled *Micrographia nova*, published by one GRIENDELIVS of Nuremberg; giving the figures of several insects, seeds, &c. many the same with those in Mr. HOOKE's *Micrographia*, but much worse designed.

Dr. PAPIN proposed an experiment, whether he could restore the air vitiated by noxious effluvia <sup>c</sup>; the trial of which was reserved till the next meeting.

<sup>b</sup> Letter-book, vol. xi. p. 25, part 1. p. 22.

<sup>c</sup> Register, vol. vii. p. 12.

*June 15,* at a meeting of the COUNCIL were present,

Sir JOHN HOSKYNs vice-president

Mr. HENSHAW

Dr. AGLIONBY

Mr. CREED

Mr. LODWICK

Mr. HILL

Mr. HOOKE.

The question being put concerning Mr. HALLEY's salary, the gratuity above 50*l.* a year to him was remitted to the farther consideration of the council, and in the mean time it was determined by ballot, that the treasurer should pay him 50*l.* for the last year's salary.

Mr. NICHOLAS FACIO DE DUILIER was proposed as a candidate by Sir JOHN HOSKYNs, and approved.

The question being put, whether the order for the payment of Mr. HOOKE's salary, made June 16, 1686, should be executed before any other orders made since either for salaries or gratuities, upon balloting, it was carried in the affirmative.

On this day there was no meeting of the SOCIETY.

*June 22,* Sir JOHN HOSKYNs vice-president in the chair.

An experiment was made of the variation of the magnetical needle ; but by reason of the wind it could not be determined as it ought : however it was several times found about five degrees westerly.

Dr. SLOANE observed, that the account given by him at the last meeting of the case of the phthiriasis, was related to him by Dr. BATEMAN, who added, that the patient broke out in pustules all over his body ; and that in those pustules lice, or an insect very like them, were ingendered.

Dr. SLOANE likewise remarked, that he had observed a sort of louse not unlike a sheep's tick breeding on swallows, which are very troublesome to them, and sometimes kill them.

Mr. HENSHAW said, that there is a sort of louse found in cod-fish, generally in the head of the fish.

Mr. NICHOLAS FACIO DE DUILIER was proposed candidate, having been approved by the last council.

Sir JOHN HOSKYNs produced a piece of artificial ruby made of a sort of glass tinged with a preparation of gold, according to Mr. KUNCKEL's method.

A

A printed paper of Monf. DE LA HIRE<sup>4</sup> was read, concerning a magnetical needle contrived by him in a circular form, supposing that such a circle would always respect the true meridian with the same points thereof, and the magnetical virtue change its place therein; alledging some experiments of the alteration of the poles of a magnet analogous to what is found in the globe of the earth.

A note of Monf. JUSTEL's was read, giving an account of some books printed at Paris, and mentioning, that the authors appointed to draw up the *Journal des Sçavans* were Messrs COURTIN, REGIS, MAILLARD, and DE LA ROQUE.

Mr. HOOKE read a farther lecture concerning the exact measure of time, and shewed the demonstration of the division of the arch of oscillation of a pendulum so as to shew equal times: which is done by dividing the arch in the proportion of sines, and taking the whole length of the arch vibrated for diameter<sup>5</sup>.

Mr. HALLEY presented the plant called star of the earth, being the chief ingredient in the remedy for the bite of a mad dog, given in by Sir ROBERT GOURDON at the meeting of the 18th of May.

Mr. HOOKE read a relation of the extraordinary force of a burning concave speculum out of the *Acta eruditorum Lipsiensia* for January 1687, p. 52. He supposed, that if such a speculum were made of many feet diameter, the effects thereof might be expected most prodigious. He proposed, that such a one might be made of copper tinned with a mixture of tin, lead, and isinglass, which might be made very large for a small price, and bear a very good polish.

Dr. HAVERS read a letter from a friend of his concerning the cure of a tenebrismus by bitter clysters, the cause of the disease being worms conglobated in the intestinum rectum. These were supposed by some of the members present to be ascarides, though the gentleman, who wrote the letter, seemed to be of a different opinion.

Dr. PAPIN gave in a paper<sup>6</sup> concerning the experiment of destroying air vitiated with noxious fumes, which he found not to answer his expectation; for having tried by means of a jet d'eau to evacuate the fumes of aqua fortis mixt with the air, he found, that the air remaining after such operation was still unfit for prepiration.

He gave an account of an experiment made to see, whether the liquor distilled *in vacuo* from white roses would coagulate, as that of red roses so distilled doth: but it was found uncongealed.

June 29, Sir JOHN HOSKYNs vice-president in the chair.

<sup>4</sup> It is printed in the *Philos. Transact.* N°. 188, p. 344.

<sup>5</sup> See NEWTON's *Philos. Natur. Princip. Ma-*

them. L. 1. prop. lii. p. 153.

<sup>6</sup> Register, vol. vii. p. 13.

Upon reading the minutes of the last meeting, Mr. HENSHAW remarked, that there was usually found on whales a louse of the bigness of a man's thumb.

Sir JOHN HOSKYNs observed, that a sort of lice are sometimes found on salmon; and that those lice are a sign, that the salmon is then out of season.

On occasion of the burning speculum, Mr. HENSHAW observed, that nothing yet found would melt black lead; and that he had tried it in a very strong heat for fourteen days together; but it came out unchanged.

There was presented from Dr. CHARLETON some salt shot upon a stick like sugar-candy, said to be brought out of Siberia, a province of Muscovy. It was believed to have been coagulated in some salt spring, and not in a river, as was said in the paper given in with it.

A note from Mons. JUSTEL was read, giving account, that Mr. ROEMER had much improved the engine, which consumes smoke, and which, he conceived, might be of great use in London, where the smoke is so offensive, and so prejudicial to household goods.

Mr. HENSHAW was of opinion, that the salt of foot being diffused in the air might probably be more prejudicial to the lungs than the smoke itself.

Dr. AGLIONBY supposed, that those vapours being diffused and diluted in the air must become less noxious than when taken into the lungs together with the fuliginous matter of the smoke.

A paper was read given in by Mr. CLUVERUS concerning some tables produced at this meeting by a foreign gentleman from Mr. WASMUTH, professor at Kiel in Holstein. These tables were said to be founded on the holy Scripture, and to serve for chronological and astronomical purposes. They were recommended to Mr. CLUVERUS to peruse and make a report of.

Mr. HOOKS read a discourse concerning a method of finding the latitude of a place by observing two equal altitudes of a star passing near the Zenith, having found two points, the one perpendicularly under the other, and the exact time betwixt them.

A paper of Dr. PAPIN was read about applying his engine for raising water by the rarefaction of the air to the raising of any sort of weight out of deep mines.

Mr. HOOKS observed, that a rope strained very tight would serve to convey force or motion much better than any such contrivance.

July 6, at a meeting of the COUNCIL were present,

Sir

Sir JOHN HOSKYNs vice-president

Mr. HILL

Dr. AGLIOSBY

Mr. LODWICK

Mr. HOOKE.

The question being put, whether Mr. HALLEY should have fifty copies of the *History of Fishes* instead of the fifty pounds ordered him by the last meeting of the council, comprehending the twenty books formerly put into the hands of Mr. SMITH the bookseller, it was determined by ballot in the affirmative.

The question being put, whether Mr. HOOKE should have the arrears, due to him by a former order of June 16, 1686, paid him in like manner in copies of the *History of Fishes*, it was ballotted and allowed: only Mr. HOOKE desired six months time to consider of the acceptance of such payment.

It was ordered, that Mr. HALLEY receive a gratuity of twenty other copies of the *History of Fishes*, in consideration of his arrears in the last year ending January 27, 1687.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

Two letters were read concerning the eclipse of the sun, May 1, 1687, the one from Mr. WILLIAM HAYLEY<sup>1</sup> made at the Strait's mouth; the other from Mr. FRANK at Barbadoes<sup>2</sup>.

A paper of Dr. PAPIN<sup>3</sup> was read about the reason of the *camera Æolica*, or engine for producing a wind by the running of water, which had been supposed to proceed from a generation of air by the agitation of the water upon a great fall. This Dr. PAPIN had found by experience to be untrue; and he proposed in this paper, that, according to the make of the engine, the air entering into the pipe, whereby the water descends, is carried down with it, and then by its levity makes its way out at the top of the vessel, while the water runs out at the bottom.

Mr. HOOKE read a discourse concerning the way of conveying force to a great distance, which he conceived would best be done by some stiff and inflexible rod, as a wire, or long pole, or the like; and shewed the experiment by communicating a force given in the inner hall of Gresham-college across the quadrangle by means of a packthread, which was found to perform to satisfaction.

Dr. ROBINSON having examined the plant called star of the earth in the receipt for the bite of a mad dog, said, that it was the *sesamoides Salamanticum Park. five Lycnis viscosa flore muscosa Casp. Baubini*, in English, *Spanish catch-fly*: that it

<sup>1</sup> His letter to Mr. HALLEY, dated at Leghorn, June 8, 1687, is in the Letter-book, vol. 22. part 1. p. 62.

<sup>2</sup> Ibid. p. 66. Mr. HAYLEY's and Mr. FRANK's

observations are printed in the *Philosoph. Transf.* N° 189. p. 370.

<sup>3</sup> Register, vol. vii. p. 13.

grows plentifully about the mills near Newmarket, and about Thetford, *Raii Catalog. Plantar. Angl.* and is described, *Raii Hystor. Plantar. tom. 2. inter Lychmidos.*

Mr. AUBREY remarked, that this plant was to be found near a place called Chalk in Wiltshire.

Dr. ROBINSON observed, that this plant had not till now been known to have any medicinal virtue.

July 13, Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes, and mention of the virtue of the plant called star of the earth, Dr. SLOANE said, that this same virtue of curing the bite of a mad dog is to be found in a book called *DE GRAY's Farrier.*

Mr. AUBREY remarked, that this specific virtue had been well attested to him.

Dr. SLOANE added, that he knew a man, who had cured twenty couple of dogs therewith.

Mr. HOOKE shewed in a microscope the crystals of the salt presented at the meeting of June 29 from Dr. CHARLETON, said to have been congealed like sugar-candy on a stick in a river of Siberia. The particles thereof were shot into square grains like table diamonds, which looked very fair in the microscope, so that it appeared to be a sort of *sal gem* or marine salt.

The minutes of the Dublin Society for several months past were read; in which mention was made of a cavity in the skull of birds reaching from one ear to the other, which was conceived to be designed for the exquisiteness of hearing. Mr. HENSHAW added, that there is a small bony fulcrum serving to support this cavity.

Dr. TYSON remarked, that he had observed a like confirmation of bones in the head of an owl, in which bird there is an extraordinary contrivance of a membrane to dilate and contract the pupil of the eye.

It being mentioned in the minutes of the Dublin Society, that a bruised scorpion is a sure and speedy remedy for the sting of it, Sir JOHN HOSKYNs remarked, that he had heard, that after the same manner the sting of a wasp might be cured by applying the bruised wasp.

There being in the same minutes an account of a rare case of a patient of Dr. MULLEN, who voided by stool a great number of small bladders filled with matter of different consistences, and some of them pretty large; Dr. TYSON observed, that such voiding of bladders, unless in dropical cases, is very rare, and most commonly in women, in whom lumps are produced from the ovarium.

Dr. TYSON communicated his observations of what occurred in the dissection of the body of Mr. SMITH of Highgate, in whose bladder were found several lesser bladders of serum, some as big as a pullet's egg, and each ureter stopped with such a bladder, and withal inflamed so, that no urine could pass by them into the bladder<sup>1</sup>.

Dr. SLOANE remarked, that upon cutting a person for the stone, there had been found, instead of a stone, only a stiff mucous substance near as big as one's fist.

Mr. CLUVERUS gave in an account of Mr. WASMUTH's astro-chronological tables, whereby he pretended from certain sabbatical periods, not only to determine the motions of the sun, moon and planets *a priori*, without observations; but also to discover the true time of any of the most remarkable occurrences in the world without history.

Mr. HALLEY gave in a figure of the eclipse of the sun observed May 1, 1687; wherein he shewed the phases thereof at London, Barbadoes and Smyrna, whose difference of meridians he determined, viz. Barbadoes 5 hours 58 minutes west, and Smyrna 1 hour 50 minutes east from London.

And from the observation of Mr. HAYLEY at the Strait's mouth he found Cape Trafalgar 28 minutes or 7 degrees to the west of London.

Dr. PAPIN gave in a paper in answer to Mr. HOOKE's objections against the way of conveying force by the rarefaction of the air. It was, that his pipes being laid in a trough, and then covered with coarse turpentine, would thereby be kept tight and secure against the passage of the air through any lesser chinks or holes, that might be left in them.

Mr. HOOKE's discourse, by reason it was now late, was referred to the next meeting.

July 20, Sir JOHN HOSKYNs in the chair.

Mr. HENSHAW observed, that a sort of owls in France and Savoy, called *Dukes*, have an extraordinary faculty of dilating and contracting the pupil of the eye.

Mr. HOOKE related, that Mr. WALLER and himself having lately dissected several eyes, had observed a great number of small thrids or nerves entering through the sclerotic into the cavity of the eye towards the bottom, and proceeding between the sclerotic and uvea, to terminate in the outward ring of the *Processus ciliaries*, so to serve for the motion of the crystalline humour, and also to make the aperture of the uvea bigger or less.

Mr. HOOKE likewise read an answer to Dr. PAPIN's objection to the communication of motion at a distance by rods, with a farther explication of the vibration

<sup>1</sup> Regiller, vol. vii. p. 16. *Philosoph. Transf.* N<sup>o</sup> 183. p. 332.

of the rods or poles : as also another discourse, wherein he farther explained the great inconvenience of Dr. PAPIN's way, and the impracticability thereof, by shewing 1, That it would be next to impossible to make pipes to hold so perfectly, as not to leak air in some parts. 2, That it would be as difficult to discover one or more such leaks, or, when found, to stop them. 3, That neither his gutters nor turpentine nor molasses would prevent those difficulties ; for that all such a gutter must be uncovered two leagues, when such leaks happen ; next, the gutters would not do up-hill and down-hill, nor cross roads : and they would be as difficult to be kept tight from leaking out those substances ; nor would they hinder evaporation. And though it were possible, yet, 4, That the air is the worst of all *media* for conveying such power, there being more strength lost thereby than by any solid medium or fluid, as water, &c. because of the great springiness thereof.

Mr. HOOKE shewed the experiment of vibration of the rods, as a pendulum, which was by suspending a large Indian-cane of about thirty feet long by two pack-threads about eight feet in length : by which it was plain how the weight of such rods or poles for communication of traction or pulsion at a distance might not only be made to move freely and with ease, but also be in the nature of the weight of a sway.

The same thing was also tried with a large scaffold-pole of above forty feet long, suspended by two small chords, which succeeded, as the former to the satisfaction of those present.

Dr. SLOANE presented a large scorpion of St. Cruz in Barbary ; which was ordered to be preserved in spirit of wine in the repository.

July 27, Sir JOHN HOSKYNs vice-president in the chair.

Upon reading of the minutes of the last meeting, it was inquired, whether there were any emission of light from the eyes of cats to help them to see in the dark, as in glow-worms, fire flies, and the like : but it was the opinion of the members present, that in cats, owls, and such like animals, the extraordinary faculty of seeing in the dark arises from the great dilatation of the pupil of the eye.

Mr. HOOKE remarked, that the light seen in the eyes of cats is rarely found but when the cat is frightened ; or else very earnest after her prey.

Sir JOHN HOSKYNs communicated the following receipt of one SIMEON PAULI for a varnish to coat and preserve dried plants ; infuse in spirit of wine the seeds of wormwood ; and then dissolve therein as much gum elemi as it will take ; and with this varnish cover the plant. This was thought to be a good means to preserve insects and any small animal from perishing.

Dr. ELWARD BERNARD of Oxford returned two Arabic psalters formerly borrowed out of the Society's library.

Mr.

Mr. HENSHAW borrowed out of the library two Greek manuscripts, containing part of the tragedies of EURIPIDES.

Mr. HALLEY gave a description of the water-galls or fish resembling gelly, which is found commonly in these seas at this time of the year.

A paper of Dr. PAPIN was delivered in concerning the computation of the velocity impressed on a bullet in an exhausted barrel: but it being late, it was referred till the next meeting.

The Society adjourned their meetings till Wednesday, October 19th.

October 19, there was no meeting for want of a vice-president: but Sir THEODORE DE VAUX being present promised a receipt for the bite of a mad dog, which he had never known to fail. He said, that he had it from MATTHIAS DE HUDLESBOSK; and that it consisted of rue, garlic, Venice-treacle, and tin-slings.

October 26, Sir JOHN HOSKYNs vice-president in the chair.

Upon reading the minutes of the last meeting, Mr. AUBREY remarked, that the Welsh have generally black eyes; and the vice-president added, that this had been noted as an argument to prove the old inhabitants of Britain and the Gauls to have been the same nation, it being observable, that their eyes are as generally black as those of the Germans are grey.

Dr. TYSON gave a relation of some very particular structures, which he had observed in the bones of the ear and eye of an owl; of which he promised a written account.

Sir JOHN HOSKYNs remarked, that he had noted in the eyes of several persons, who were very sharp-sighted, that the iris was of different colours, when looked on in a different position. This he conceived to be caused by some corrugation in the surface of the iris; whereby those persons were enabled to dilate their pupil extraordinarily upon occasion.

There was presented from Mr. JAMES FRAZIER the fowl called capercaill or cock of the wood, being found in the fir-wood in the Highlands of Scotland, being a larger sort of heath-cock of the black kind.

Mr. HOOKE read a letter to himself from Mr. WALLER concerning stones, as nautili and ophiomorphites, lately found by him near Cainesham-bridge in Gloucestershire\*. One of these stones was evidently formed in the shell of a common nautilus, but much bigger than the usual sort; and not only the diaphragms were most distinct, but also the holes in them, whereby the several cavities communicate, were indisputably discovered, and no room left to doubt of its having been once a shell.

\* Letter-book, vol. xi. part I. p. 67.

A paper of Dr. PAPIN was read concerning a way of applying the force of gun-powder to raise weights, and to other mechanical uses<sup>a</sup>; of which he shewed the experiment. It was by rarefying the air included in a cylinder by the flash of the powder, and then applying the weight of the atmosphere to drive down a plug into the evacuated cylinder, being the way mentioned in the *Nouvelles de la Republique des Lettres*.

A letter in Latin from JOHN PHILIP WURTZELBAUR of Nuremberg to the Royal Society, dated there, March 31, 1687<sup>c</sup>, was produced, containing an account of many of the sun's meridian altitudes taken in that city the last year, which sufficiently proved the latitude of it and the obliquity of the ecliptic to have been unaltered since the time of BERNARD WALTHER, or the year 1487.

Part of a letter of Mr. WILLIAM MOLYNEUX, dated at Dublin, July 7, 1687<sup>d</sup>, was read, intimating his desire, that a new map of the world might be made according to the late observations.

Mr. WALLER's account of the tides at Bristol was produced.

Sir JOHN HOSKYNs desired, that the capperail or cock of the wood should be inquired after from Ireland, where Dr. MOULIN said they were commonly found in the market.

November 2. Sir JOHN HOSKYNs vice-president in the chair.

Sir THEODORE DE VAUX gave in a paper concerning the cure of the bite of a mad dog, being several receipts found by him among the papers of Sir THEODORE MAYERNE. This was ordered to be published in the *Philosophical Transactions*.

Dr. TYSON having said, that there was a circular bone within the ball of the eye of an owl, to help to dilate or contract the pupil, Mr. WALLER remarked, that he had observed the same thing in a lap-wing; and that the French anatomists in their *Memoires pour l'Histoire des Animaux* assert the same contrivance in the eye of the eagle.

Mr. ADAIR being present said, that the male capperail is much less than the female: that that presented at the last meeting was a female. This bird being supposed to be of the kind of our black game of heath-cocks was said to be the best meat of wild fowl, but the flesh thereof apt to corrupt.

Sir THEODORE DE VAUX remarked, that near Carcassone in Languedoc there is a hill called *Montagne de Priape*, where the stones are commonly formed into

<sup>a</sup> Register, vol. vii. p. 20.

<sup>c</sup> *Ibid.* p. 64. It is printed in the *Philosophical Transactions*, N<sup>o</sup>. 190. p. 425.

<sup>d</sup> Letter-book, vol. xi. part I. p. 70.

<sup>e</sup> N<sup>o</sup>. 191. p. 408. for December 1687.

the shape of a human penis; one of which stones he promised to bring and shew to the Society.

There was presented from Monf. JUSTEL a book sent to the Society by Monf. VILLERMONT from Paris, where it was lately printed, concerning the trisection of an angle, pretended to be done by right lines and a circle.

Mr. HOOKE read a discourse upon the periplus of HANNO, wherein are several things seeming to favour his notion of the great changes, that have happened in the earth; as where mention is made of countries flaming in the night, and a high mountain expiring fire; the description of which seemed to agree with the Canary isles, which Mr. HOOKE conceived to have been blown up by fire,

Mr. ADAIR mentioned, that to the westward of the isles of Scotland called the Hebrides there was an island, which had been frequently seen from the land of Argyle's jurisdiction: but it was not known, that any person had been upon it.

November 9. Dr. GALE vice-president in the chair.

Dr. GALE gave an account, that there were two sorts of heath-game in England, viz. the red and the grey game: That the cock of the grey game is black like the fowl produced at the last meeting: and that he had been informed, that the white spots, which are found on the feathers of the tail of this bird, wear away with age, and at length disappear.

Mr. HOOKE gave his report of Monf. TARRAGON's book of the trisection of an angle, which had been recommended to him at the last meeting, viz. that this construction was not general, and only extended to the trisection of such angles, whose third parts were the  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ , &c. of some other angle had by the bisection of an angle.

Mr. HALLEY read a letter in Latin to himself from Mr. WURTZELBAUR, dated at Nuremberg, 16 Sept. 1687, O. S.<sup>1</sup>, containing his observations of the eclipse of the 1st of May, 1687<sup>2</sup>.

He read likewise several letters, containing accounts of the tides, which he had procured to be observed on the south coast of England.

There was produced a sheep's head, out of the neck of which grew a short leg. It was desired of some of the physicians of the Society to examine it, and see after what manner it was articulated in the skull or vertebræ of the neck.

Dr. PAPIN gave in a paper about the quantity of air evacuated by the flash of gun-powder in his experiment tried on the 26th of October; which paper was read,

<sup>1</sup> Register, vol. vii. p. 63.

<sup>2</sup> See *Philos. Transact.* N<sup>o</sup>. 189. p. 371.

and

and it appeared, that forty six parts of fifty nine of the whole cavity of the vessel had been emptied of air.

Mr. PITFIELD presented his translation of the *Memoires pour servir à l'Histoire des Animaux* by the Royal Academy of Sciences at Paris; to which is added, *An Account of the Measure of a Degree of a great Circle of the Earth*, translated from the French by Mr. WALLER.

Dr. PAPIN repeated the experiment made at the meeting of the 26th of October with a third part of the gun-powder used then, but supposed three times as strong: and the effect was, that the air expelled was equal in bulk to 2 lb. 5 oz. of water, the powder being but half a scruple.

Mr. ADAIR shewed several of his curious riaps of Scotland made from his late survey.

Nov. 16. Sir JOHN HOSKYNs vice-president in the chair.

There was presented from Mr. BOYLE a book lately published by him, and intitled *A Disquisition about the final Causes of Natural Things, wherein it is inquired, whether, and (if at all) with what caution a Naturalist should admit them. To which are subjoined, by way of Appendix, some uncommon observations about vitiated sight*. Mr. HOOKE was desired to peruse this book, and give an account of its contents.

Dr. MOULIN reported, that he had examined the sheep's head, produced at the last meeting; and that there appeared no articulation or junction of the spurious leg either with the skull or spine, but that it was tied by a ligament to the pericranium; and that the inner end of the bone was small and pointed like a quill.

Part of a letter of Mr. LEEWENHOECK, concerning the generation of ants, was read; wherein he was of opinion, that the white things, taken for their eggs, are really worms, which, he said, he had observed to be hatched into ants in a little time. The rest of the letter was referred to the next meeting.

A committee was chosen by ballot for auditing the treasurer's accounts, consisting of Sir RICHARD BULKELEY, Mr. HERBERT, Mr. MEREDITH, Mr. ASTON, and Mr. POVEY.

Sir RICHARD BULKELEY produced a paper sent him from Ireland, being the copy of a letter from the Bishop of Meath to Mr. WILLIAM MOLYNEUX, containing several particulars of the examination of a young wench in Ireland, out of the corners of whose eyes there proceeded grains of corn, as of wheat, oats, rye or barley. The circumstances were very extraordinary, and all precautions taken to prevent fraud: but it was found, that the same sort of grains still issued; so that, how unlikely soever the thing might seem, the fraud, if any, could not be  
2 discovered,

discovered. It was observed, that ten grains in an hour's time was the greatest number evacuated by her.

November 23, at a meeting of the COUNCIL were present

	The Earl of Carbery president,
Sir JOHN HOSKYNs	Mr. WALLER
Dr. GALE	Mr. HOOKE
Mr. PITFIELD	Mr. LODWICK.
Mr. CREED	

The president signed an order for the payment of the gratuity given Mr. ASTON of sixty pounds by an order of council of December 16th, 1685.

An address of Dr. PAPIN was read, desiring the payment of his arrears of salary by reason of his being about to leave England, in order to be professor of mathematics in the university of Marpurg.

It appearing to the council, that the debts of the Society are such, that they cannot otherwise be satisfied, it was ordered, that their stock in the East-India company be sold; and that Mr. HILL advise the best he can to do it speedily.

The president signed an order for the payment of sixty pounds to Mr. HOOKE, which had been ordered him on the 16th of June, 1686.

It was ordered, that Dr. PAPIN be paid 22 *l.* 10 *s.* in full of all accounts, being three quarters salary: and the president signed an order accordingly.

At a meeting of the SOCIETY on the same day, Sir JOHN HOSKYNs vice-president in the chair.

The minutes of the last meeting were read.

Mr. HOOKE gave an account of Mr. BOYLE's book of *Final Causes*, wherein by a great many instances he endeavours to shew the unreasonableness of those, who deny design in the proceedings of nature. The second part of the book being an account of several accidents befalling the eyes, Mr. HOOKE desired, that it might be perused by some physician of the Society.

The latter part of Mr. LEEWENHOECK's letter of September 9, 1687, concerning the generation of ants was read, wherein he concluded three things, 1. That the real eggs of ants are exceedingly small, and not bigger than ordinary grains of sand. 2. That out of these eggs are worms produced, which being without any motion of their own and helpless are fed by the old ants; whence it comes to pass, that they are so busy in carrying food to their nests in summer, and not in order to lay up any magazine of provision against winter, as was vulgarly supposed: and 3. That those which, were most commonly called ants eggs,

are either those worms or aurelæ of young ants, or else a sort of webs, wherein one sort of ant-worms were observed by Mr. LEEWENHOECK to wrap themselves a little before their maturity. He took notice by the way of the manner of the stinging of ants, which he found not to be by biting, as some imagined, but by a real sting in the tail, which is all along on the back thereof grooved with a deep groove not unlike the scheit used by seamen to wet sails withal; by means of which groove the ant conveys to the point of her sting a small drop of venomous transparent liquor, which by its acrimony occasions the smart and swelling, that generally follows the sting of ants.

Sir JOHN HOSKYNs gave his opinion as to the reason, why the young ants should be found without motion, whilst they are yet white; viz. because the bones, which in such ants are like shells on the out-side of their limbs, are not yet firm; whereby they want the necessary instruments of moving themselves.

Mr. HALLEY desired, that he might bring in an experiment in order to determine the quantity of vapour arising out of water warmed to a certain degree; which he conceived might be of good use in the explication of several phenomena in meteorology and the theory of fountains and springs; as also to shew the reason of that remarkable current out of the Ocean into the Mediterranean sea: which experiment he was ordered to prepare against the next meeting.

Nov. 29, at a meeting of the COUNCIL were present

Sir JOHN HOSKYNs vice-president,

Mr. EVELYN

Mr. PITFIELD

Mr. HILL

Mr. HOOKE

Mr. LODWICK

Mr. WALLER.

Mr. CREED

It was ordered, that Mr. HOOKE be paid 22*l.* 10*s.* for three quarters of a year's salary due to him at Christmas last.

A committee of the council for auditing the treasurer's accounts was ballotted for and chosen, viz. Mr. LODWICK, Mr. PITFIELD, and Mr. WALLER, who were to meet the next morning at eight o'clock.

Mr. HAUTEFEVILLE, Mr. MIDDLETON, and Mr. WILLIAM WOTTON were proposed to the council as candidates, and being ballotted for were approved to be propounded to the Society for election.

The vice-president signed an order for the payment of 20*l.* to Mr. HUNT the operator for half a year's salary due July 14 last.

He likewise gave an order for the payment of the sum of 12*l.* being in full for sixty copies of the *Philosophical Transactions* of a sort from N°. 184. to N°. 188. inclusive.

■

Nov.

November 30, being the day of the anniversary election of the council and officers of the Society, the Earl of Carbery president in the chair, the following eleven members were continued of the council ;

JOHN Earl of Carbery  
THOMAS Earl of Pembroke  
DR. THOMAS GALE  
MR. HENSHAW  
MR. HILL  
Sir JOHN HOSKYNs

MR. PEPYS  
MR. WALLER  
Sir JOSEPH WILLIAMSON  
Sir CHRISTOPHER WREN  
Sir CYRIL WYCHE.

The ten elected into the council were

HENRY Duke of Norfolk  
GEORGE Earl of Berkley  
MR. HAYNES  
MR. HERBERT  
MR. PERRY

Sir WILLIAM PETTY  
DR. PIT  
DR. PLOT  
DR. SLARE  
DR. TYSON.

The Earl of Carbery was continued president :

MR. HILL was continued treasurer :

DR. GALE and RICHARD WALLER, Esq; were chosen secretaries.

Decemb. 1, the Earl of CARBERY in the chair.

After the minutes Mr. HOOKE read a lecture, being first a recapitulation of several things, which he had produced before the Society the last year, particularly concerning the spheroidal figure of the earth, the mutation of the poles, and the consequences thereof \*. He then cited a passage out of PLATO's *Timæus*, seeming to make much for his hypothesis of the frequency of floods and conflagrations. It was the relation of an old man to PLATO's grandfather, who had it from an Egyptian priest, that the island of Atlantis was once so considerable, as to have inhabitants, who had conquered good part of Africa and Europe ; but that in one day's time the whole island sunk into the sea. Lastly, he gave a translation of HANNO's *periplus*, from some passages whereof he collected, that there was then a conflagration of some lands, which, as he interpreted the words κατ' ἄλγυ, were in the latitude of 36 degrees, and, as he conceived north-west from Madera ; and he supposed the mountain called Σῶν Ὕψηλα in this *periplus* to be the pic of Teneriffe ; asserting, that he had good grounds for it ; and that the *caldera* or basin on the top of it is warm with a subterraneous heat.

DR. GALE remarked, that κατ' ἄλγυ would bear the sense, which Mr. HOOKE put upon those words ; but he supposed this *periplus* to be of a Greek rather than Carthaginian original, because all the names of places are Greek.

\* See his *Posthumous Works*, p. 377. & seqq.

To this it was answered, that the Greek translator might take the liberty to change significant names into his own language.

Dr. GALE observed, that the reputed author, or perhaps translator, of this *periphus* was one HIERONYMUS LAMPSACENUS.

Mr. ASTON presented from the author FRANCIS JESSOP, Esq; his book lately printed, intitled, *Propositiones hydrostaticæ ad illustrandum Aristarchi Samii systema definitæ*, &c. which was delivered to Mr. HOOKE to bring in an account of.

A letter of Mr. JOHN WEICHARD VALVASOR, containing an accurate description of the lake Zirknitz in Carniola <sup>h</sup>, was produced and ordered to be read at the next meeting.

A letter of Mr. LEEWENHOECK, containing his microscopical observations on cochineal and the Jesuit's bark, or chinachina, was produced, and ordered to be translated.

Mr. HALLEY read an account of the quantity of vapour, which in a day's time exhales from the surface of water <sup>i</sup>; and by experiment proved it to be in the warmth of summer not less than a tenth of an inch in twelve hours: whence computing the quantity of vapour raised out of the Mediterranean sea, as likewise that, which is emptied into it by the rivers, he found, that the vapours exhale were nearly three times as much as the rivers replenished, taking the rivers with the most and the vapours with the least, so that the difference seemed yet greater. The experiment, on which this argument is founded, was repeated before the Society at the end of the meeting.

Decemb. 14, at a meeting of the COUNCIL were present

The Earl of CARBERY president

SIR JOHN HOSKYNs

Mr. HAYNES

Sir CYRIL WYCHE

Mr. PERRY

Mr. HENSHAW

Mr. HERBERT

Mr. HILL

Dr. TYSON

Dr. SLARE

Mr. WALLER.

Dr. PIT

The president signed an order for the delivery of a piece of plate of sixty pounds value to Mr. WILLIAM MUSGRAVE, being a gratuity given him by an order of council of Decemb. 16, 1685.

It was ordered, that Mr. ASTON, in consideration, that his gratuity of sixty pounds hath been two years unpaid, and that for two years of the time since he was last excused his weekly payments by an order of council of Novemb. 21, 1683, he was secretary to the Society, be farther exempted from the said payments till Michaelmas last.

<sup>h</sup> It is printed in the *Philosoph. Transact.* N<sup>o</sup> 191. p. 411. <sup>i</sup> Ibid. N<sup>o</sup> 189. p. 336. for Sept. and Oct. 1687. Mr.

Mr. PERRY, Dr. PIT, Dr. SLARE, and Mr. HERBERT were sworn of the council.

A motion being made, that it was convenient, that the Royal Society's stock in the East-India company should be transferred from Sir JOHN LAURENCE's name to that of some other gentleman of that company, a member of the Society: it was ordered, that Sir JEREMY SAMBROOKE should be desired to take it; and that a letter be written to Sir JOHN LAURENCE about it.

It was ordered, that Dr. PAPIN have a present of four copies of the *History of Fishes*, and a letter testimonial under the seal of the Society of the good services rendered them by him.

Dr. GREW's index to the rarities in the repository was referred to Mr. WALLER, Mr. PERRY, Dr. TYSON, Dr. PIT, and Dr. SLARE, as a committee to inspect and make a report of it.

Mr. JOHN WEICHARD VALVASOR of Carniola was proposed candidate to the council and approved for election.

It was ordered, that the treasurer pay Mr. HOOKE thirty-seven pounds ten shillings, as a farther gratuity, and in full of all demands since the last order of November 29 past.

At a meeting of the SOCIETY on the same day, Sir CYRIL WYCHE vice-president in the chair.

The minutes of the last meeting were read.

Mr. HOOKE read a discourse tending to shew, that the antient story couched in fable had yet a real and truly historical interpretation\*. And after that manner he interpreted the story of PERSEUS in OVID, deriving PERSEUS from *περίπτωση*, and understanding by him lightning; and the metamorphosis of ATLAS to have been the destroying the Hesperian gardens, and blowing up by a subterraneous fire the great mountain Atlas in the place where they were.

He promised to shew a like mythology of several of the other fables of antiquity.

Mr. JOHN WEICHARD VALVASOR of Carniola, Mr. WILLIAM WOTTON, Mr. HAUTEFEUILLE, and Mr. BENJAMIN MIDDLETON, having been proposed candidates to the council, and approved, were this day elected fellows of the Society.

The first part of Mr. JOHN WEICHARD VALVASOR's letter from Carniola was read, being an accurate description of the lake Zirknitz in that country, with an account of the several subterraneous passages and holes, at which the water enters

\* See his *Pythagorean Works*, p. 377. & seq.

into, and leaves the lake ; as also of the manner of fishing in those holes ; with the titles and tenures of the several gentlemen having right to the fishery of the lake. The rest of the letter was referred till the next meeting.

A paper of Sir PHILIP SKIPPON was read, containing an account of several Saxon coins lately found in Suffolk, with several curious remarks thereupon by that gentleman \*. On the reverse of one of these coins he found the word *sterling* ; by which it appears, that that word was of Saxon original, and not brought in by the conquest : whereby a mistake of GRONOVIVS *de sefertis*, p. 346, who affirmed the contrary, is rectified.

Some further remarks on the same coins by Mr. WILLIAM WOTTON † were referred to the next meeting.

Sir RICHARD BULKELEY produced a letter from Mr. WILLIAM MOLYNEUX, somewhat calling in question an account, which he had before sent out of Ireland concerning a girl, who discharged grains of wheat, barley, &c. out of the corners of her eyes ; for that a person there, upon trial, found, that without pain or trouble he could easily hide several grains under his eye-lid, which of themselves will flart out, unless now and then kept back with the finger.

The same letter contained an account of a great inundation of water, which had lately done great damage to the city of Dublin.

Dr. PAPIN presented to the Society his engine for the circulating of water by the rarefaction of the air ; a description of which is given in N° 178 of the *Philosophical Transactions* ‡.

Mr. HALLEY shewed an experiment, whereby the evacuation of the lake of Zirknitz and its sudden filling again were exemplified. He took two basins, and placed them one higher than the other, and ordered them so as to communicate by pipes placed at different heights, so that the water ran out of the upper, when it was full, much faster than when it was in part empty : and the under basin had only one pipe to let out the water, which it received from the upper, not large enough to emit all that came, when the upper was kept near full : so that then the under basin filled, and a third basin put into the under, with several holes pierced in the bottom, would continue with water in it ; but the water of the upper basin decreasing, and the communication with the under at length ceasing, the water of the under basin would in some time be drawn off, and the third basin, with the holes in the bottom, would be left dry ; very well representing the manner of the replenishing and evacuating of the lake of Zirknitz, as described by Mr. VALVASOR.

The Society adjourned till after the Christmas holidays.

\* *Philosoph. Transact.* N° 189. p. 356. for Sept. and Oct. 1687.

† *Ibid.* p. 351.

‡ P. 1274 for Decemb. 1685.





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